BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

VOL. XLVII 1915 No. 5

THE NEW YORK STATE BARGE CANAL

By WILFRED H. SCHOFF
Secretary, The Commercial Museum, Philadelphia

Popular interest in the completion and opening of the Panama Canal, upon which the Federal Government has incurred an expense approximating $400,000,000, has naturally tended somewhat to obscure another great American waterway now almost completed at a cost to a single state which will approximate $140,000,000. This waterway is, of course, the New York State Barge Canal, being a reconstruction on modern plans of the old Erie Canal, originally built by the State of New York and opened to traffic in 1825. Great as the national achievements have been on the Isthmus of Panama, and world-wide in its commercial importance as that waterway will be, it is not stretching the truth to say that in some of its commercial aspects the New York Barge Canal will be of even greater importance, and that its reconstruction will have a far reaching effect on freight rates and freight carriage that will be felt in normal times internationally, as well as locally. Indeed, in the construction of the Barge Canal the state engineers of New York have had to meet and overcome more varied difficulties than the army engineers in the Canal Zone, and while their work has to its credit no Gatun dam, no Culebra cut and no concrete structures equaling those of the Panama Canal in size, the New York work shows achievements second only in size to those at Panama, and in a far

[1] This part of Mr. Schoff's paper is largely given to the development of the Erie Canal, to the causes that impelled its reconstruction and to the vast work of planning and providing for the building of the New York State Barge Canal. The remainder of the paper will describe the building of this great public work, its economic importance and its relation to other large systems of transportation.

greater variety, including problems of waterway construction never before solved. When it is realized that the excavation on the Barge Canal will exceed 115,000,000 cubic yards as compared with approximately 200,000,000 at Panama; that the concrete work on

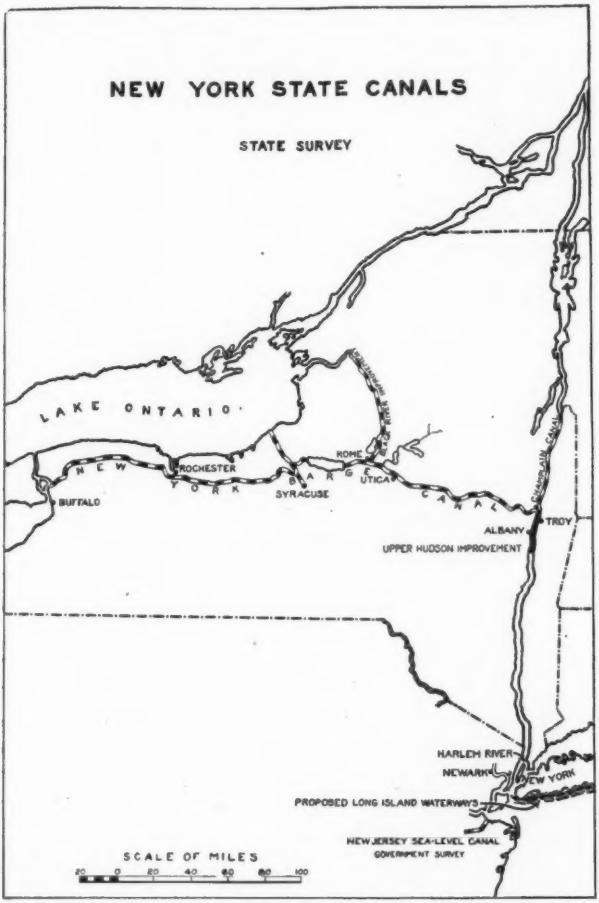

FIG. 1—Sketch Map of New York Barge Canal and connections.

the New York Canal will approach 3,000,000 cubic yards, as compared with 5,000,000 at Panama; that the length of the New York waterway is 540 miles, as compared with 50 at Panama; with 39

dams as against 4 on the Isthmus; 57 locks as against 6; with an infinity of aqueducts, bridges, by-passes, spillways and other hydraulic structures not thought of at Panama; with the watershed of a large part of the Adirondack Mountains impounded for canal service, comparing very respectably in area, if not in total rainfall, with the Panama Canal watershed—it may be seen that the engineers and the citizens generally of New York State have a reasonable basis for pride and interest in the great work which they have undertaken. Subtracting tropical rainfall, sanitation and the peculiar instability of rock strata on the Isthmus, the problems to

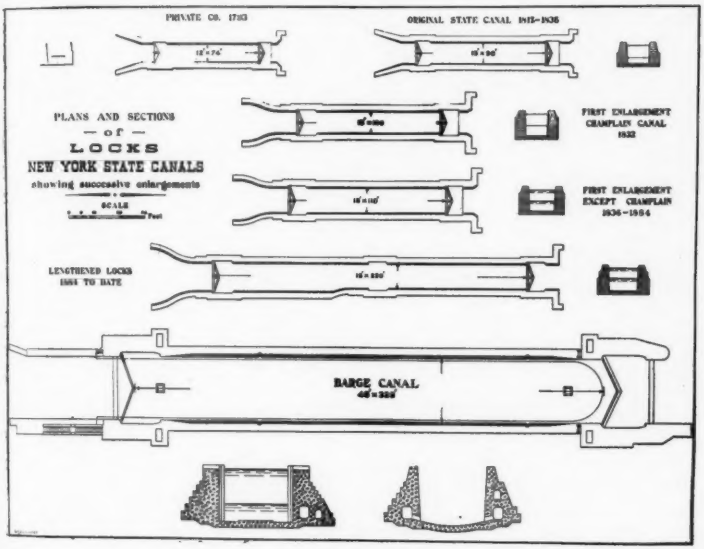

FIG. 2.

be surmounted there were largely of rapid and economical excavation and handling of the spoil. In New York State, on the other hand, there were rivers and lakes to be canalized; water-supply to be provided in an area of moderate rainfall; spring freshets to be cared for without damage to adjacent property; excavation to be undertaken through rock of many grades of hardness, from the loose, porous shale of western New York to the hard, flinty strata of the upper Mohawk; and the engineers were restricted in their work by the State law which required navigation on the old Erie Canal to be kept open throughout the period of reconstruction.

There was also in New York no possibility of organizing a great working force under military control, and therefore under conditions of the highest efficiency, the state engineer being required to parcel the work out in sectional contracts, the conditions of which required completion of some before commencing others, and the whole work being conducted under annual appropriations, great in the aggregate, but still less in amount than those available at Panama. Under these circumstances it is not at all surprising that the official opening of the New York Barge Canal may be delayed two or three years beyond the opening of the Panama Canal. But it is by no means certain that the New York work, when opened, may not be in a condition of greater stability throughout the line than that at Panama, where the dredges may be eating away at the Culebra slides for years to come. And it is certain that the New York Barge Canal when open will take rank at once among the four greatest artificial waterways in the world—the St. Mary's Falls Canal, leading in tonnage the Suez and Panama Canals, following in the order named, while the New York Barge Canal may even exceed the tonnage at Panama.

Economic Causes of the Reconstruction

The valleys of the Hudson and Mohawk Rivers formed the earliest trade route by which communication was established between the settlements on the Atlantic seaboard and the Great Lakes and the interior. The Appalachian Mountain chain, which runs parallel with the coast line from north to south, is broken at the head of the Hudson River, so that the western passage required no tedious and expensive mountain climb at that point, and the valley of the Mohawk, flowing eastward into the Hudson, formed the natural westward trade route.

As early as 1768 improvement of the Mohawk River at the Falls of Canajoharie was recommended by the Colonial Governor, Sir Henry Moore. A survey for a canal around Niagara Falls, to be utilized in connection with a system of canals and slackwater navigation by way of the Oswego and Mohawk Rivers, was made in 1784, this being substantially the same route recommended by the Federal Deep Waterway Board in 1900. The first canal law in New York was passed in 1791 authorizing the improvement of the Mohawk River to the Hudson, and in 1792 a law was passed incorporating two companies—the Western to provide transportation from the Hudson to Lake Ontario, and the Northern from the

Hudson to Lake Champlain, stock in both companies being subscribed for by the State. In the spring of 1796 the Western canals were opened from Schenectady to Seneca Falls for boats of sixteen tons capacity, and freight charges were reduced to $32 per ton for the down trip and $16 per ton for the up trip, as compared with $75 to $100 per ton, the rates previously in force. The Western Company expended about $400,000 up to 1813. The total length of its artificial channel was about fifteen miles. The locks were 12 feet x 74 feet, built of wood and afterwards changed to brick.

The Northern Transportation Company expended about $100,000 on the route from the Hudson to Lake Champlain, which was a total loss. In 1798 a law was passed for a canal around Niagara Falls, but nothing was ever done on that project.

The first suggestion of an Erie Canal as a link in a comprehensive plan of internal transportation was made by George Washington in 1784, without result. An Erie Canal undertaken by the State of New York was again suggested by Gouverneur Morris in 1803, still in advance of public opinion, but in 1808 the State Legislature authorized a survey of the route, anticipating that the Federal Government would aid in constructing the canal. This act contemplated a waterway from the Hudson to Lake Ontario, and a canal around Niagara Falls to Lake Erie. Appeals were made to Congress and to the State for aid, but without result, and in 1812 the State surveys were completed for a continuous waterway between the Hudson River and Lake Erie, substantially along the route subsequently authorized by law. The project for a canal to Lake Ontario for vessels of fifty to sixty tons capacity was rejected because of insufficient water supply at the summit level, and because freight for export once having reached Lake Ontario could be delivered at Montreal in any case at a lower cost than at New York City. At that time the greater part of the commerce at New York was from the central and western part of the State, then only recently opened for settlement after acquisition of extensive areas from the Indians; and it was considered more important to tap these central settlements than to connect with Lake Ontario. In 1812 the Legislature appropriated $5,000,000 for canal construction, but war broke out with Great Britain, and the act was promptly repealed. Construction was authorized in 1817, contracts executed in 1821, and the completed canal was opened to traffic in October, 1825.

The original canal was designed for barges of thirty tons capacity

to carry 1,000 bushels of wheat, and the locks were 15 x 90 feet, the dimensions being 40 feet surface width, 4 feet depth and 26 feet bottom width. These dimensions were soon outgrown as the great interior was opened for settlement. In 1835 a general project of enlargement was approved, which was not fully completed until 1862. Under this plan the dimensions were increased to 70 feet surface width, 7 feet deep and 52 feet bottom width, and the locks were made 18 x 110 feet for barges of 100 tons capacity carrying 3,333 bushels of wheat. In 1884 the capacity of the canal was again increased, this time not by widening its sections, but by doub-

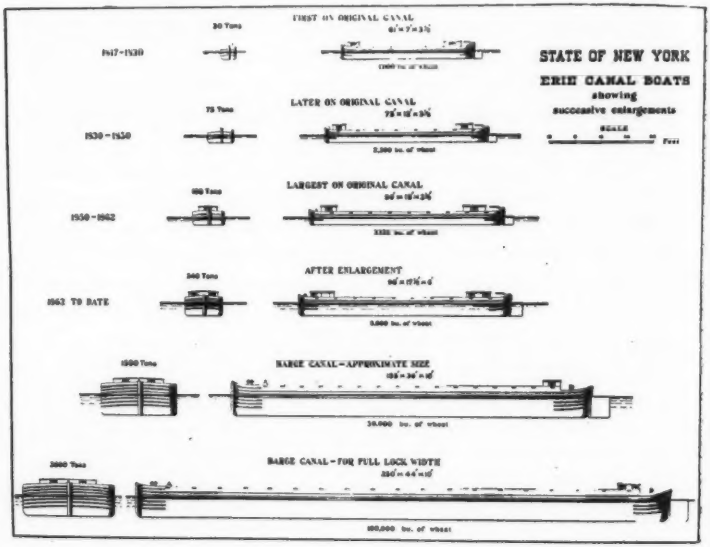

FIG. 3.

ling the length of the locks, the dimensions of 18 x 220 feet enabling the passage of barges of 240 tons capacity carrying 8,000 bushels of wheat.

The record of the Erie Canal up to this time was one of continual usefulness and profit to the State which had constructed it. The original cost of the main line, 363 miles, was $7,143,790, and of the enlargement completed in 1862, $31,834,041. The total cost of the enterprise, including land damages and interest on loans, was $52,491,916, and of repairs 1827 to 1862, $10,995,333. These large sums were more than repaid by collection of tolls. The consoli-

dated financial report of the Canal Department to the end of 1882 showed the following remarkable figures:

Revenues.	Cost of Collection, Supt. and Repairs	Profits from Operation	Cost of Constr. and Improv.	Net Profit
$121,461,871	$29,270,301	$92,191,570	$49,591,853	$42,599,718

At that time it was realized that the State of New York had derived a sufficient profit from its undertaking and a constitutional provision was adopted for abolition of canal tolls. For a few years business on the Erie Canal rapidly increased, but then came the period of great improvement of the railroad systems of the country,

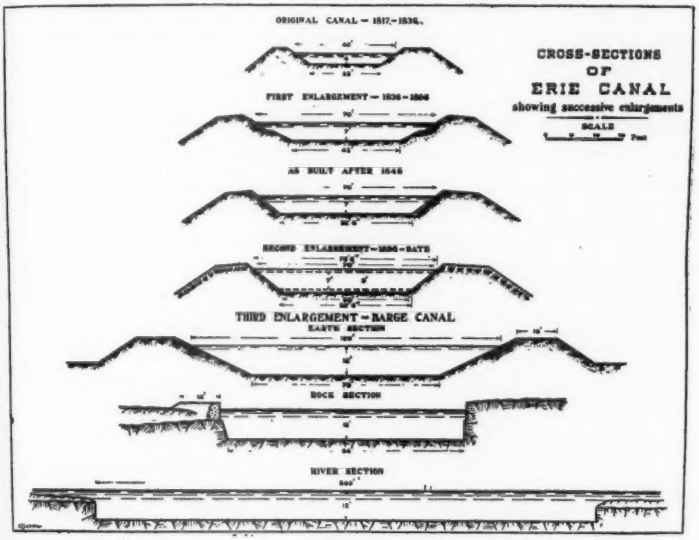

FIG. 4.

the installation of heavier rails, more powerful locomotives and larger freight cars, which made it difficult for the small old-fashioned canal barge to compete. For about fifteen years traffic on the Erie Canal steadily declined and it became a serious question whether the whole system should be abandoned, or whether the State should undertake another reconstruction on modern lines, which necessarily involved a very much greater expense than any of the earlier canal work.

A United States Board of Engineers on Deep Waterways was appointed by President McKinley under an Act of Congress approved in 1897 to make surveys and examinations of deep water-

ways and the routes thereof between the Great Lakes and the Atlantic tide waters.

This Board made a thorough study of several routes to connect the Great Lakes with Atlantic tide waters.[2] Their report submitted to Congress in 1900, contained recommendations for a ship canal through American territory between Lake Erie and Lake Ontario, this paralleling the Canadian Welland Canal in the same way that the American and Canadian Canals parallel each other at the "Soo." Two routes were considered between Lake Ontario and the Atlantic, one running from the St. Lawrence River to Lake Champlain, and thence to the Hudson; the other running from Oswego to Oneida Lake, and thence down the Mohawk valley to the Hudson. Of these routes, the latter, Oswego-Oneida-Mohawk, was evidently the more feasible. The purpose of the army engineers was to provide a waterway of adequate size for ocean-going vessels, and of uniform descent from Lake Erie, 573 feet above sea level, to tide water. The cost was not exhaustively figured, but it was apparent that it would reach, if not exceed, $500,000,000, and the Federal Government decided that the cost of an interstate waterway was greater than it cared to undertake, and that any reconstruction of the Erie Canal should be left, like the original waterway, to the State of New York.

In New York State there had been for years an agitation on the one side for improvement of the Erie Canal, and on the other for its abandonment. Each side rested upon engineering opinion of high character. Under these circumstances, Theodore Roosevelt, then Governor of New York, appointed a Committee on Canals, headed by Gen. Francis V. Greene, who were requested to co-operate with the State Engineer and the State Superintendent of Public Works toward finding a solution of this great question. This committee reported three main conclusions: first, that the canals connecting the Hudson River with Lake Erie, Ontario and Champlain should not be abandoned, but should be maintained and enlarged; second, that the project of a ship canal to enable vessels to pass from the upper lakes to New York City or beyond without breaking bulk would be a proper subject for consideration by the Federal Government, but not by the State of New York; third, that the project of 1895 for enlargement of the Oswego and Champlain Canals should be completed.

The committee carefully considered the question of a ship canal

[2] *House Doc. 149, 56th Congress, 2nd Session.*

connecting the Great Lakes with the ocean, for which at that time there was considerable popular agitation, and reported it not feasible, owing to the difficulty of constructing vessels so as to be economical and commercially successful over such a route. The ocean steamer, according to the committee's report, being built to withstand the fierce storms of the Atlantic, cost to construct about $71 per net ton of carrying capacity. The vessel to navigate the Lakes, less substantially built, designed for Lake harbors of smaller depth, and to withstand less frequent and less dangerous storms, cost about $36 per net ton of carrying capacity. The cost of the canal fleet, on the other hand, consisting of tow boat and barges, was less than $7.50 per ton; allowing for increased cost of labor and materials, the construction cost at the present time would be similarly disproportionate. The committee considered it impossible to combine the three types of vessels, having a difference in first cost as great as between $71, $36 and $7.50 per ton of carrying capacity, into one vessel which would be as economical for the through trip as to use the three existing types with two changes of cargo, one at Buffalo and one at New York. Owing to the greatly reduced speed which would be necessary over any artificial waterway, the cost of operation of the ocean-going steamer would be so largely increased as to raise necessary freight charges above barge freight plus transfers.

This report of the committee headed by Gen. Greene was favorably received by the Legislature, but no definite action was taken for commencement of the work until the session of 1903. At that time, with the strong endorsement of Governor Odell, a bill providing for the issuance of $82,000,000 in bonds to complete a 12-foot canal for 1,000-ton barges was introduced, and upon a further report from the State Engineer making some additions to the project, and allowing for increased cost of labor and materials, the amount required was placed at $100,562,993. This project was accepted by the Legislature and enacted as Chapter 147, known as the $101,000,000 barge canal act.[3] This act provided for issuing 18-year canal improvement bonds not to exceed $101,000,000, a general annual tax of .0012 of a mill being authorized for each million of dollars in bonds outstanding in any fiscal year. The act directed improvement of the canals at a uniform bottom width of 75 feet, 12 feet depth, and 1,128 square feet of cross section, except at aqueducts and through cities, where the width and cross

[3] *New York Assembly Documents 1903, No. 20.*

section might be modified under certain limitations. In rivers and lakes the channel was to have 200 feet bottom width, 12 feet depth and at least 2,400 square feet of cross section, locks to be 328 feet long, 28 feet wide and 11 feet over the sills. The route fixed by the act was by way of the Hudson River, Troy to Waterford, thence by a new channel to be constructed to the Mohawk above Cohoes Falls, to canalize the Mohawk River to Rome, thence down Wood Creek across Oneida Lake, down Oneida River and up Seneca River, rejoining the existing canal at Clyde, and thereafter by the old Erie Canal route to Tonawanda on the Niagara River, and by that river and Black Rock Harbor to Lake Erie. This act was submitted, as required by law, to the popular vote at the general election in November, 1903, the results showing 673,010

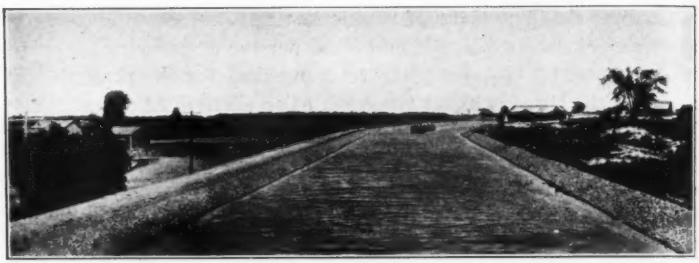

FIG. 5—A completed section of the Barge Canal near Rochester

in favor and 427,698 against, or a majority of 245,312 for Barge Canal reconstruction.

Completion of surveys, plans and specifications took the entire year 1904. Bids were advertised and opened in December of that year, various contracts entered into and work began at Fort Miller, on the Champlain Canal, April 24, 1905, and at Waterford, on the Erie Canal, June 7, 1905. In that year the New York Legislature passed a law permitting an increase in size of the locks. After further study of this question, the state engineer recommended, and the board accepted plans for locks 328 feet long, 45 feet wide and 12 feet deep over sills; the material to be of concrete instead of cut stone as originally planned, and the gates to be of steel instead of wood.

Subsequently two important additions were made to the acts authorizing issuance of bonds for barge canal purposes. The State Senate, by resolution February 4, 1909, called on the State Engineer

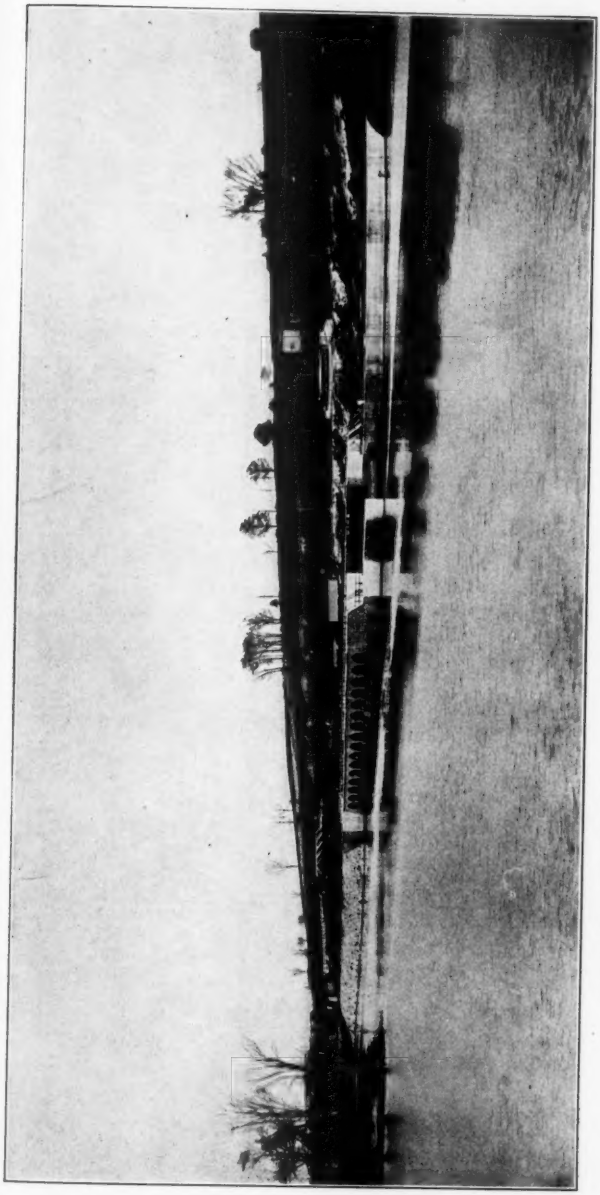

FIG. 6—"The Old and the New." Barge Canal lock in canalized river. Old barge in canal ditch above.

for a report on the project of adding Cayuga and Senaca Lakes to the barge canal system. Mr. Frank M. Williams, then State Engineer, reported on March 27, that the project was entirely feasible, and that the cost of connecting both lakes would be a little over $8,000,000. Following this report, the Legislature adopted a bill authorizing the sale of $7,000,000 of bonds for enlarging the Cayuga and Seneca Canal to barge canal dimensions, so that after that date the so-called "Finger Lakes" project was incorporated in the general plan. Again in 1914, $19,000,000 was authorized to be issued, not for canal construction, but to cover a very important adjunct to facilitate the widest possible use of the canal; namely, construction of free public terminals at about fifty different cities and villages adjacent to the barge canal system.

Construction of the barge canal has proceeded continuously since work began in 1905, and according to the present estimates of the State Engineer's office, the eastern half of the waterway, including the Champlain branch between Troy and Whitehall; and the section between Troy, Oneida Lake and Oswego will be completed and opened to traffic during the present season of 1915. The western section between Rochester and Tonawanda is also completed to barge canal dimensions. In the central section, especially in the Clyde-Lyons region, and at Rochester, owing to many unforeseen difficulties, progress has been delayed, and work amounting to about 15% of the entire undertaking still remains to be placed under contract and will require two to three years under favorable conditions for completion. In the Clyde-Lyons region the trouble was due largely to the swampy and unfavorable nature of the soil, while at Rochester there were complications arising from necessary re-location of numerous railroad lines, requiring tedious litigation before a settlement could be reached. Serious delays were caused along the lower Mohawk, where abutting property owners and holders of riparian rights joined in litigation which long prevented the completion and closing of the concrete dams at Crescent and Vischers Ferry. Obstacles such as these, also larger expenses for land and railroad damages than were originally anticipated, and increased cost of labor and materials since inception of the work in 1905, have combined to raise the figures of total cost of construction so that one of the first acts of State Engineer Williams, on resuming possession of his office after re-election thereto in 1914, was to notify the Legislature that additional allowances would be required to complete the work already projected. A part of the

delay was due also to the necessity of arriving at a definite understanding with the United States Government as to the share which the Federal engineers would take in improvement of approaches to the barge canal. Owing to the meagreness of Federal appropriations for New York projects for many years, the State Engineer's office assumed that it would be necessary for them to improve two sections strictly within the jurisdiction of the Federal Government: namely, the Hudson River between Troy and Waterford, and Black Rock Harbor, by which connection is had between Tonawanda and Buffalo. It was not until the State work had progressed for nearly five years that the Federal Government finally decided to assert its exclusive jurisdiction over navigable streams, and undertake the adequate improvement of the upper Hudson and the Niagara Rivers. Even now, although the Federal work is substantially completed at the western end, the projected improvements at Troy and on the descending channel between Troy and Hudson may lag behind the completion of the work undertaken by the State engineers.

(*To be continued*)

THE SUGAR BEET IN GERMANY, WITH SPECIAL ATTENTION TO ITS RELATION TO CLIMATE*

By EUGENE VAN CLEEF
State Normal School, Duluth, Minn.

To What Extent Does Climate Influence the Sugar Beet Crop? A positive or negative answer cannot be given to this question, although evidence seemingly leading in one direction or the other is available. The period of observation and study is much too short to give absolutely conclusive results. In fact, most of the quantitative observations cover such brief and disconnected periods that almost any sort of conclusion seems at first hazardous. Still, from the few statistics at hand, coupled with the experiences as related by a number of men who have devoted most of their lives to sugar beet growing or some other phase of the industry, an effort to ascertain a little evidence that may at least lead to something definite is worth while.

Figure 8† presents a general survey of the relation of production, temperature, rainfall and area planted. The temperature and rainfall curves, it should be noted, represent the averages for the *growing months*, April to September inclusive. Breslau and Magdeburg, as previously stated, constitute the centers of the two areas of principal production. Inasmuch as these stations do not differ markedly in latitude, altitude or even sufficiently in longitude to cause any decided difference in the broad climatic characteristics, it has been considered permissible to combine them and thereby empirically approach perhaps something of a generalization for the entire sugar beet zone.

Regardless of all other factors which might be mentioned that could have caused or helped cause the fluctuations in the production curve, it must be admitted that these variations are strikingly similar to those in the rainfall curve (Fig. 8A and C). A seeming relation to temperature is also visible, though not so convincing. A detailed analysis follows.

For those years in which there occurred a considerable change in area planted no comparisons will be attempted. In 1898 the rainfall and temperature both increase and the production decreases. In 1904, with no very marked rise in temperature but a

* Concluded from pp. 241–258, April *Bulletin*. † On p. 252 of April *Bulletin*.

decrease in precipitation, production again decreases. In 1911 with a decided rise in temperature and an even more marked fall in precipitation, the crop decreases, despite an increase in area planted. In 1903, with an increase in temperature and rainfall or a return to what might seem normal, judging from the curve as a whole, the crop increases. In 1905, with temperature stationary and an increase in rainfall, an amount equal to its decrease during the preceding year, the crop increases. Exactly what is the

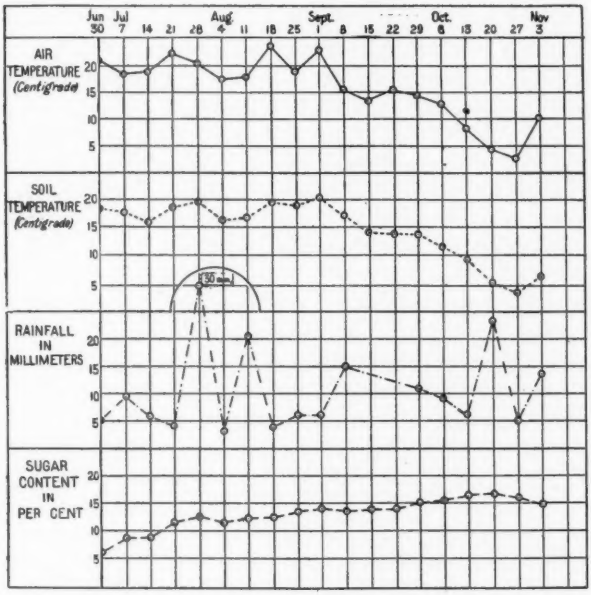

FIG. 15—Curves to show close relation of sugar development in the plant, and weather elements. Curves also indicate relation of soil temperatures and air temperatures.—Ref.: Kuntze, Delitzsch, Germany.

balance between rainfall and temperature that will effect a normal crop or an exceptional crop? There seems to be an optimum lurking here somewhere. What it is cannot be stated.

A still closer view of the relation to temperature and rainfall is possible in Figure 15. Although these observations represent only one season they possess suggestions not to be overlooked. The air temperatures and soil temperatures vary uniformly and in the same manner, excepting one or two minor details. In addition,

the curve for sugar *content* is introduced. This is of importance, since, as detailed above, it is possible under certain weather conditions to obtain a large production of beets with a *small* sugar content. The general increase in percentage of sugar from June to October is normal. The variations in this increase will be discussed. An analysis follows:

The week from July 7 to 14 represents a decrease in rainfall and soil temperature, but an increase in air temperature; the sugar content remains essentially constant. A rise in temperature, with continued decrease in rainfall, occurs the following week; the sugar content increases decidedly and continues to increase, with a continued rise in the soil temperature, but a fall in air temperature. During the next week, July 28–August 4, the percentage decreases, apparently due to the decrease in air temperature and unusually heavy rainfall of the week previous, or due to decrease in air temperature combined with decrease of rainfall. In the week of August 11-18, with a rise in air and soil temperature and a return of rainfall to what might seem to be a normal amount, the sugar content rises slightly. Proceeding to the next striking variation, September 1-8, the percentage curve falls, while a rapid rise in rainfall accompanied by a sudden drop in temperature occurs. For the week of October 20 essentially similar conditions obtain. Again definite conclusions cannot be drawn. One can only say that the variations in percentage of sugar in the beet and the variations in both temperature and rainfall are suspiciously intimate.

Table II is an attempt to uncover some relationships by empirical means, perhaps not always apparently logical. Breslau and Magdeburg are again employed. The temperature and rainfall for these two chief production centers are given from 1893 to 1912 and compared with the total production of beet sugar in Germany during the same period. Columns 1 to 9 contain the figures, while columns 10 to 16 interpret these figures in terms of increase or decrease over the preceding year by means of algebraic signs. In the averages for temperature and rainfall (columns 1–2 and 5–6, respectively) the periods of growth according to Briem are used as a basis. Sub-column *a* always represents April-May; sub-column *b*, June-July; and sub-column *c*, August-September. Rainfall and temperature figures respectively for each of the two cities are combined in columns 7 and 9 (formed, respectively, by addition of columns 5 and 6 and 3 and 4). In column 8 is given the total beet sugar production of Germany in round numbers. Columns 10, 11,

TABLE II—RELATION OF BEET SUGAR PRODUCTION IN GERMANY TO TEMPERATURE AND RAINFALL, 1893–1912.*

	1 Breslau Average Temperature C°			2 Magdeburg Average Temperature C°			3 Avge. Temp. Breslau C°.	4 Avge. Temp. Magdeburg C°	5 Breslau Average Rainfall in mm.			6 Magdeburg Average Rainfall in mm.			7 Rainfall, mm. B + M	8 Total Production for Germany in 1000 tons Ton=1000 kgs.	9 Temp. C° B + M	10 Fluctuations in Column 7	11 Fluctuations in Column 8	12 Fluctuations in Column 9	13 Breslau Rainfall Fluctuation			14 Magdeburg Rainfall Fluctuation			15 Breslau Temperature Fluctuation			16 Magdeburg Temperature Fluctuation			
	a	*b*	*c*	*a*	*b*	*c*			*a*	*b*	*c*	*a*	*b*	*c*							*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*	
1912	14.6	18.9	12.5	10.6	18.4	12.9	15.3	13.9	113.0	126.0	197.0	89.0	98.0	129.0	752.0	**2750**	27.7	+	+	−	+	+	+	+	+	+	+	+	−	−	−	−	1912
1911	11.5	18.5	18.1	12.6	18.7	18.4	16.0	16.6	87.0	47.0	95.0	28.0	79.0	28.0	364.0	1497	32.6	−	−	+	−	−	−	−	−	−	+	+	+	+	+	+	1911
1910	11.4	18.2	15.0	11.4	17.7	15.2	14.9	14.8	113.7	140.8	208.8	43.0	119.2	171.1	796.6	**2589**	29.7	+	+	+	+	−	+	−	−	+	+	+	−	+	+	−	1910
1909	9.8	16.8	16.8	10.4	16.3	15.8	14.5	14.2	101.9	205.9	85.8	55.6	133.4	107.3	689.9	2037	28.7	+	−	−	−	+	−	−	+	+	−	−	+	−	−	+	1909
1908	11.0	18.8	14.5	10.5	18.7	14.6	14.8	14.6	150.0	172.2	110.9	114.1	67.5	71.4	686.1	2079	29.4	−	−	+	+	+	+	+	−	−	−	+	−	−	−	+	1908
1907	11.2	17.1	15.8	11.4	15.6	15.2	14.7	14.1	88.5	113.7	107.7	58.9	227.6	98.9	695.3	2138	28.8	−	−	−	−	+	−	−	+	−	−	−	+	−	−	−	1907
1906	12.8	17.8	15.4	12.3	17.6	15.8	15.3	15.2	127.9	65.9	170.3	97.8	199.6	115.1	776.6	2242	30.5	+	−	+	−	−	+	+	+	+	+	−	−	+	−	○	1906
1905	10.3	19.5	16.5	10.1	19.1	15.8	15.4	15.0	132.2	137.3	105.4	73.5	180.5	108.6	737.5	**2400**	30.4	+	+	−	+	+	+	+	+	+	−	+	+	−	+	+	1905
1904	11.1	18.7	16.2	11.7	18.2	15.7	15.3	15.2	72.5	45.0	51.9	60.5	45.9	45.5	321.3	1605	30.5	−	−	+	−	−	−	−	−	−	+	+	○	+	+	+	1904
1903	10.4	17.3	16.2	10.1	17.1	15.6	14.6	14.3	118.2	159.8	112.9	99.3	76.8	128.6	695.6	**1921**	28.9	+	+	+	+	+	+	+	−	+	+	+	+	+	+	+	1903
1902	9.0	16.9	14.8	9.1	16.8	14.0	13.6	13.3	74.5	152.4	66 2	69.3	110.9	98.0	571.3	1789	26.9	−	−	−	−	+	−	−	+	−	−	−	−	−	−	−	1902
1901	12.0	19.3	16.0	11.7	18.8	16.2	15.8	15.6	94.2	88.0	128.0	85.9	85.1	107.2	588.4	**2302**	31.4	+	+	+	+	−	+	+	−	+	+	+	−	+	+	−	1901
1900	9.9	19.1	17.1	10.2	18.6	16.4	15.4	15.1	68.7	138.4	35.4	69.8	146.3	78.7	537.3	**1979**	30.5	−	+	+	−	−	−	−	+	−	+	+	+	+	+	+	1900
1899	10.7	17.1	15.9	10.3	17.3	15.5	14.6	14.4	215.7	157.5	98.1	174.7	126.5	84.9	857.4	**1795**	29.0	−	+	−	+	−	−	+	−	−	−	+	−	−	+	−	1899
1898	11.5	16.3	16.6	10.4	15.7	17.2	14.8	14.4	142.1	222.7	140.4	116.8	139.3	38.6	799.9	1722	29.2	+	−	+	+	+	+	+	+	−	+	−	+	+	−	+	1898
1897	10.8	18.4	13.6	10.1	17.7	16.6	14.3	14.8	122.3	201.6	133.6	77.2	114.1	121.2	770.0	**1844**	29.1	−	+	+	−	+	−	+	−	−	+	−	−	+	−	+	1897
1896	9.0	19.1	15.5	9.5	18.2	14.9	14.5	14.2	136.9	199.2	164.7	57.2	139.5	128.5	826.0	**1821**	28.7	+	+	−	+	+	+	−	+	+	−	−	−	−	+	+	1896
1895	11.9	19.3	17.4	11.9	17.9	11.9	16.2	13.9	55.6	81.3	116.6	63.9	87.2	77.4	482.0	1637	30.1	−	−	+	−	−	+	+	−	−	−	+	+	○	+	−	1895
1894	12.4	17.8	14.6	11.9	17.6	14.2	14.9	14.6	91.6	147.2	106.9	41.5	139.0	140.8	667.0	**1827**	29.5	+	+	−	+	+	+	+	+	+	+	−	−	+	−	−	1894
1893	10.7	18.5	15.9	11.6	17.9	16.0	15.0	15.2	63 5	96.2	61.5	21.8	89.0	66.0	398.0	1366	30.2	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	1893

* *a*=April-May *b*=June-July *c*=August September.

12 correspond respectively to columns 7, 8, 9; columns 13 and 14 to columns 5 and 6; and columns 15 and 16 to columns 1 and 2. The plus sign indicates an increase over the corresponding figure in the preceding year, the minus sign a decrease. For example, the temperature in 1894, column 9, is less than (—) in 1893, in 1895 more than (+) in 1894, and in 1896 less than (—) in 1895, etc. The year 1893 may represent a plus or minus year, since no figures precede; therefore it is representd by both signs. The production figures and the algebraic signs for the year showing an increase over a preceding year are shown in bold-faced type. The observations follow.

Columns 7, 8, 9, and 10, 11, 12: The production in 1893 was exceptionally small considering all of the subsequent years; hence, however slightly improved the conditions might have been in 1894, the production would in all probability show an increase. In the subsequent nine years in which increases occurred an increase in *both* rainfall and temperature appeared four times—namely, in 1901, 1903, 1905 and 1910. In two years, 1896 and 1912, an increase in rainfall and a decrease in temperature are apparent. It is to be noted, however, that these variations occurred after the temperature of the preceding year was exceptionally high and the rainfall unusually low. Further, it is noteworthy that the two years of minimum production—namely, 1893 and 1911—possess essentially the same temperature and rainfall values.

Carrying the analysis to columns 13 to 16, a few more interesting situations appear. During the two years 1894 and 1912, when decided increases in production occurred, the fluctuations in each period were correspondingly similar, excepting in temperature in the second period for Breslau, column 15 *b*, and in the first period for Magdeburg, column 16 *a*. Again, for 1901 and 1910, years of increase and almost equal production, the fluctuations correspond, except in the rainfall for the first period for Magdeburg, 14 *a*. For 1903 and 1905 changes are parallel, excepting for three periods only, namely, in the rainfall in the second period for Magdeburg, column 14 *b*, and in the temperature in the first period for Breslau, column 15 *a*, and in the second period for Magdeburg, column 16 *a*.

If the conditions for the periods of decided decrease in production are sorted out, namely, 1893, 1895, 1904 and 1911, it may be observed that fluctuations with reference to the respective preceding years are identical. Further, the actual figures for these years,

columns 7, 8 and 9, show that the combined rainfall for Breslau and Magdeburg is always less than 500 mm, the temperature above 30.0° C. and the production under 1,650,000 tons. An analysis of the figures for the periods reveals a very low rainfall, apparently unusually low, during the second period, never reaching above 100 mm, while the temperature is rather higher, 18.0° C (two instances of 17.9° C).

In concluding the very brief analysis of this tabulation it seems again apparent that there is an optimum for a normal crop, which might be ascertained if observations were extensive enough. At times when one seems to have a hold on something definite the data prove inadequate and the grip slips. There remains but to quote some of the men who have studied this situation, mostly qualitatively, to substantiate, in part at least, some of the above observations.

"It is clear that climate is effective, although just how seems uncertain, for opinions differ. . . . Others fall back on the chemical content of the soil, but this in turn may be shown to be affected by climatic elements."—Prof. Krüger, Bernburg (12).

"There is an optimum of growth depending on temperature conditions—a minimum which determines the lower limit and a maximum determining the upper limit with a happy medium."—W. Rimpau (13).

"The quantity of the harvest is unusually influenced by the water supply, in fact much more so than by any other factor that may affect the vegetation."—Wallny (14).

Extracts from reports on crop conditions in *Die Deutsche Zuckerindustrie,* a weekly journal:—Province of Saxony, "During the past week measurable quantities of rain did not fall; accordingly the quality of the beets decreased somewhat."

Western Brunswick: "The heavy weather during the end of last week, with its 54 mm of rainfall, again soaked the soil, so that the beets showed a considerable increase in weight, but on the other hand an equal decrease in sugar content."

"The pronounced influence of meteorological elements in many diverse ways is absolutely certain and, further, among other things, is a determining factor in the distribution and concentration of the chemical constituents in the root and in the leaves. . . . Meteorological elements are also quite likely responsible for the so-called *Aufschiessen*—sudden growth of the leaves of the beet. . . ." (16).—Dr. E. O. von Lippman.

Neither temperature, water nor sunshine alone is more or most

important, for conditions may arise where there is sufficient of the one but insufficient or too much of the other. It is true, however, that soils, no matter of what kind, no matter of what chemical composition, will not support vegetation independently of temperature and water conditions, which also have a definite relation to each other. Insolation, wind and relative humidity are also factors to be considered. Inasmuch as these climatic elements seem to determine the development of a profitable sugar beet crop, a crop of national importance, the establishment of a series of observation stations throughout the growing district, combined with a careful study of the observations, should without doubt prove of immense commercial value to all the people.

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EXPLORATION OF THE KAISERIN AUGUSTA RIVER IN NEW GUINEA, 1912–13

By C. O. SAUER

The basin of the large Kaiserin Augusta River, which roughly bisects Kaiser Wilhelm Land in the northeastern part of New Guinea[1] had been very little known until the German expedition of 1912-13 carried out its extensive explorations. The war has apparently deferred the publication in detail of the results of this important geographical work but it was summarized last year in a paper published by the Berlin Geographical Society[2], of which the following is an abstract:

The expedition for the exploration of the Kaiserin Augusta basin, equipped by the German Colonial Office, the Royal Museums and the German Colonial Society, reached the Protectorate on February 8, 1912. The party was in charge of Bezirksamtmann Stollé, and included Ledermann, botanist, Bürgers, zoologist, Roesicke, ethnographer, and Behrmann, geographer.

The main base was established near Malu, a village about 250 miles from the mouth of the river. Here the party was increased by four German officials, eleven Chinese boatmen, fifty native soldiers, and numerous carriers. The Kaiserin Augusta River is navigable by motor boats for a distance of 560 miles and its tributaries increase this mileage considerably. The main routes of exploration therefore were by water. In the nineteen months which the party as a whole spent in the field, all the tributaries as far as the Dutch boundary were explored to the extreme limit of their navigability and four overland exploring trips were made of an average length of three months.

The main stream is characterized by extensive meanders even in its upper course; cut-offs are common, but are destroyed rapidly by the rank growth of vegetation. The maximum variation of water-level was twenty-four feet, and the highest stage occurred at the end of the rainy season. The natural levees attain a height of ten to twelve feet and a width of 650 feet. Undercutting is active at low water stages, and is facilitated by seepage that softens the stream

[1] Kaiser Wilhelm Land was acquired by Germany in 1885-86. The town and harbor of Friedrich Wilhelm, the seat of government, were occupied by the Australian naval forces at the end of September last.

[2] Geographische Ergebnisse der Kaiserin-Augustafluss-Expedition. Von Dr. Walter Behrmann. *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, 1914, No. 4, pp. 249-277.

banks. Along the margin of the river, reeds and wild sugar-cane grow; farther back, at least on the upper course, is the forest, whose outer edge is usually a young growth of bread-fruit trees. On the lower course are vast grassy swamps, infested by mosquitoes. The native population is concentrated largely upon the banks of the river. Because of the strong shore-current, the Kaiserin Augusta has built no regular delta, but its sediments are shifted to the west and there have formed a lagoon three miles wide and twelve miles long. Below Malu, the country is still in an amphibious condition and for the most part impassable. At certain crevasses the river inundates regularly large areas, and in these backwaters fish abound. Here the natives build villages on piles, attracted by the easy supply of food.

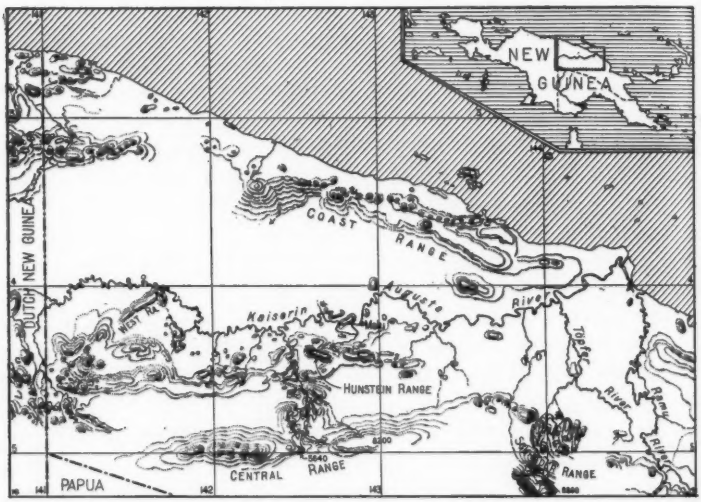
At the mouths of the tributaries is a zone of grassy swamps. Above, there are luxuriant forests, which are however in many cases merely a screen in front of the sago swamps that intervene between river and upland. On the upper tributaries natives were found who had never heard of white men and were unacquainted with iron. All of the navigable affluents of the Kaiserin Augusta enter from the south, five above Malu and three below. The lowest, largest, and most interesting of these is the Töpfer River, which seems to receive a considerable part of its water from the Ramu River, which it approaches to within two miles. On its banks live advanced tribes, skilled in the making of pottery and engaging in commerce.

The density of population is less than had been expected. In the area visited by the main expedition there are not more than 27,000 people. The number of tribes is great, and between them are in many cases uninhabited buffer zones. The people are mostly small, but no pygmies were found; the upper part of their bodies is unusually well developed. On the upper river the houses are characterized principally by their large size, accommodating about forty persons, and by being built upon piles thirteen to twenty feet long. The farther downstream, the easier are materials for building secured from the driftwood of the river. The artistic sense of the people expresses itself especially in the assembly-houses, which are well designed and elaborately decorated with carvings, paintings, and woven goods. In some sections the natives show considerable aptitude in the production of cultivated crops, and tobacco grown by them has been found to be of excellent grade.

A meteorological station was kept at Malu, and observations were taken at 6 A. M., 2 P. M., and 8 P. M., with the following averages (Centigrade) respectively: 23.9°, 31.4°, and 26°. The annual mean

was 27.1°C. The total precipitation was 114 inches for the year, which is supposed to have been abnormally wet. Rain fell with great regularity in the evening or at night, and was often accompanied by violent whirlwinds, which uprooted trees and overturned houses.

From Malu to the Dutch border the lower courses of the tributaries are abnormally wide, and in many cases form lakes before they debouch into the main valley. The mountain mass is here sinking at a rate somewhat more rapid than that at which the rivers aggrade their flood-plains. Alluvial plains penetrate far into the



Sketch map of the Kaiserin Augusta River region in German New Guinea. Scale, 1:4,400,000. Based on Pl. 53 in *Petermanns Mitteilungen* for December, 1918, which is compiled from the original maps in the *Mitt. aus den Deutschen Schutzgeb.*, the *Zeitschr. der Gesell. für Erdkunde zu Berlin* and the *Deutsches Kolonialblatt.*

interior of the western mountains, and surround numerous outlying spurs. On the east, on the other hand, valley terraces record a recent elevation of the land.

The overland expeditions determined the hitherto virtually unknown character of the interior mountains. Progress was very slow because of the difficulties encountered, among which the daily fogs, the dense vegetation, the absence of anything edible in the forests, and the knife-like character of the ridges were chief. Most troublesome was a forest region, in which heavy washing had laid bare the

roots of the trees to a depth of three to five feet, and the roots were covered with dripping wet moss. To secure a view it was often necessary to make a clearing. On one expedition the crest of the central range was reached at an elevation of 5,640 feet. This was south of the Hunstein Range, where the central range does not exceed 8,200 feet. At the eastern end of the area a high range, called the Schrader Range, leads off into the foreland. One of its summits, 6,890 feet high, was ascended; from this place a chain far in the interior was observed, which is estimated to rise to 11,700 feet. On the west, an expedition penetrated to the area previously explored by Leonhard Schultze. Rocky peaks, joined by knife-like ridges, are common. The bared rock surfaces are the result of landslides, caused by the falling of trees, whirlwinds, or cloudbursts. The mountains have sharply chiseled erosional forms.

The main mountain range extends into the former German colony from Dutch New Guinea, and takes a course far inland to the Bismarck Range. East of the international boundary it divides digitately into ranges which decline gradually and disappear beneath the alluvium of the Kaiserin Augusta basin. The coast range consists, in so far as it has been examined, of coralline limestone, recently elevated. The structure of the island has been determined by block-faulting, one of the great lines of displacement being the depression occupied by the Kaiserin Augusta-Ramu-Markham valleys. The movements involved still express themselves in frequent earthquakes. The rivers are adjusted to the orogenic structure and have modified the relief of the mountains. The Kaiserin Augusta River flows out of the angle between the West Range and the Dutch mountains, and passes around the West Range in a broad arc. Tributaries occupy gaps between the other ranges.

The existence of mineral resources was not investigated. Judgment is also reserved as to whether plantations could succeed under present conditions.

THE STEADY WARMTH OF THE TROPICS

By MARK JEFFERSON *

The steadiness of the warmth in tropical regions is difficult to realize without actual experience of it, especially for points near the coasts. *Torrid* zone is as much a misnomer as *temperate* zone. It is not hot for the most part. New York, Chicago and Detroit all have greater heat on occasional summer days than points close to the equator, but down there it *stays* warm. Even the nights cool off but little.

The only way to get some idea of this, short of an actual voyage, is from such records as the two here shown. They are from Ancón, in the Panama Canal Zone, and Detroit, Michigan. They consist of the observed maximum and minimum temperatures for every day from Oct. 1, 1912, to Oct. 31, 1913, for both places. Ancón is on the south side of the isthmus, near the Pacific end of the canal, and is sheltered from the trade winds by the isthmus. It is nine degrees north of the equator.

Both places happened in that year to have the same maximum temperature of 96°, Ancón on the 27th of April, Detroit on the 15th of June. However, Detroit has seen the thermometer at 101°, four degrees warmer than Ancón's maximum (in eight years) of 97°. It has been hotter, that is, in Detroit than at Panama, which is also true of a vast number of places in the temperate zone. At Yuma, Arizona, the thermometer has been up to 119°. That is nearly thirty-three degrees north of the equator. This temperature can probably be matched at many other points, all in the temperate zone, in southwest Australia, in Arabia and northwestern India. As far as I can learn, the torrid zone knows no such heat.

To return to Detroit, this record shows it to be hotter than Ancón on fifteen occasions in June, July, and August of 1913, though the nights were almost always cooler than in the tropics. It is certainly *warm* in the tropics, but the characteristic feature which this diagram brings out excellently is not so much the great intensity of the heat as its astonishing steadiness. This is usually shown by quoting the monthly mean temperatures, as given in the two curves of

* Assisted by Genevieve Clark, instructor in geography, Michigan State Normal College.

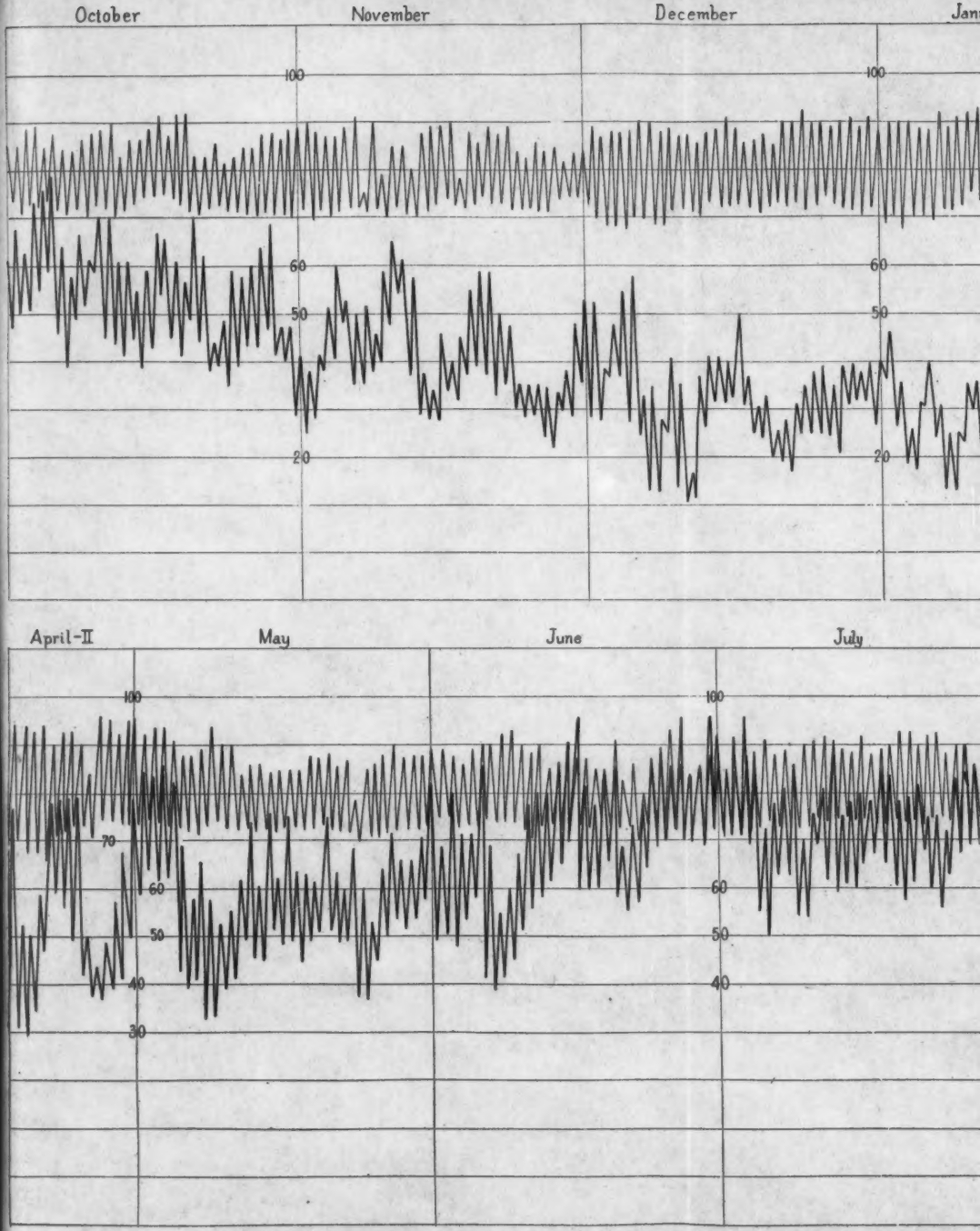
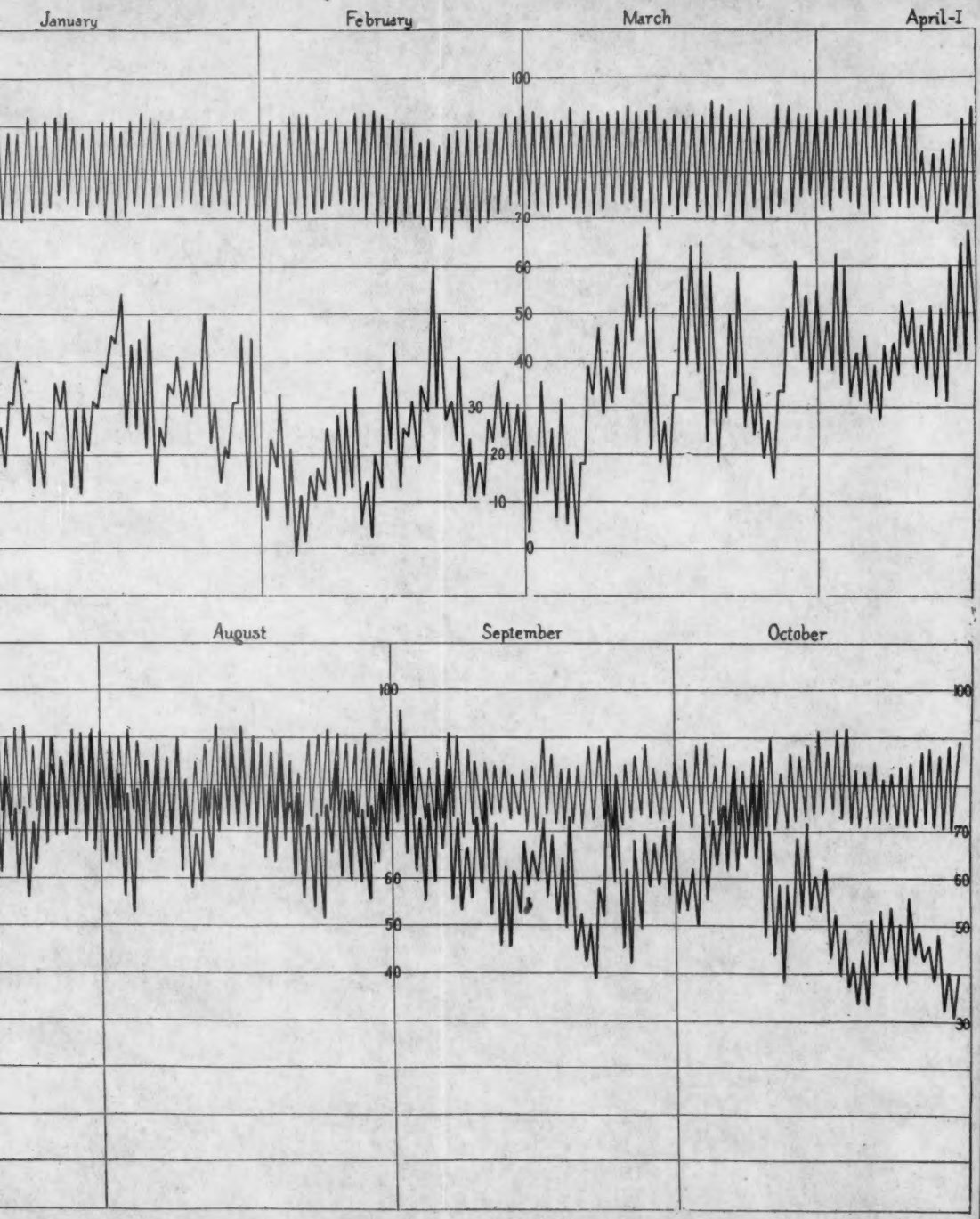


FIG. 1—Daily oscillations, for the period October 1, 1912, to October 31, 1913, of the actual temperature at Detroit, Mich. (heavier



. (heavier curve) and Ancón, Panama Canal Zone. Ancón is near the Pacific end of the Canal, nine degrees north of the equator.

Figure 2, for the same year, with 50° difference between summer and winter for Detroit and no seasons perceptible at Ancón. The sun is overhead at Ancón about mid-April and the end of August.

But averages are unreal things to study. The merit of Figure 1 is that the actual facts of each day are there given. *Ancón is always warm,* is the first conclusion I draw from it. The temperature there rose to 90° in the day time in every month of 1913, and only twenty-four times in the year did it fall below 70° at night. Almost every day there is a temperature change of from 15° to 20°.

The saying that night is the winter of the tropics is also illustrated by the curve. Night is without exception colder than day, which is by no means to be said of our winter temperatures in the temperate zone. The 3rd, 4th, 7th and 8th of January at Detroit, for instance, had noonday cooler than the previous night. The only seasons in the tropics are the dry and rainy ones.

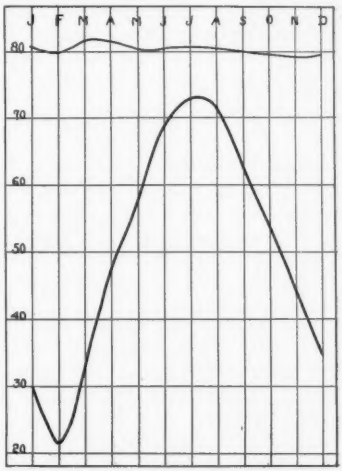


FIG. 2—Annual temperature curves for Detroit, Mich., and Ancón in the Panama Canal Zone.

It will be noticed, however, that the heat of day is five or six degrees less from May to October, inclusive, dropping from 91° or 92° in November, December, January, February and March to 86° or 87° in the rest of the year. This is the season of rains. From May to October every month but July has over eight inches of rain, while January, February, March and April have less than an inch each. As the rains imply clouds the heat of the sun is lessened in the rainy season. Fogs, too, are then very prevalent. The nights, moreover, are one or two degrees warmer in the rainy season, radiation from the ground being doubtless prevented or, rather, hindered by the clouds. But thanks to a high humidity at this time this may well be the most uncomfortable time of the year.

The second thing to be learned from the curves is that the characteristic of the temperature of our *temperate* zone is our "spells" of weather. This is quite as pronounced in its way as the greater differ-

ence from summer to winter, and throughout the winter it is more distinct than the differences of day and night. March is a good example, with its four warm spells and four cold spells. From 3°, March 6th, the temperature rose 67° on the 13th, to drop again to 15° on the 15th of the month. Such a warm spell was the "January thaw" of the middle of that month. As usual there were several of them. On the right of the diagram, October has "Indian summer" in its initial warm spell, following the cold spells of late September. Other cold spells appear as the "early frosts" of November and the "late frosts" of May.

It is impossible to run the eye along the graph for Ancón without being impressed by the fact that the warmth of the tropics is amazingly steady.

NORTHERN PATAGONIA[1]

A RESUMÉ OF MR. BAILEY WILLIS'S SURVEYS ALONG THE FORTY-FIRST PARALLEL

By ISAIAH BOWMAN
Department of Geography, Yale University

INTRODUCTION

The versatile and brilliant quality of Mr. Willis's work has nowhere else been shown to such good advantage as in the series of books and reports on Patagonia that have come from his pen during the past two years. A condensed account of his first season's work was published in the *Geographical Journal* (London), Vol. 40, 1912, pp. 607-615: "Recent Surveys in Northern Patagonia."[2] The latest contribution is a striking book entitled "Northern Patagonia," published in an English and a separate Spanish edition by authority of the Ministry of Public Works of the Argentine Republic and accompanied by a set of thirteen maps showing geologic, topographic and forestry conditions and a tentative land classification of the Andes of Northern Patagonia. For the present this volume closes the series of reports, as the

[1] Northern Patagonia. Character and Resources. Vol. 1: A study of the elements of development in the region tributary to the national railway from Port San Antonio to Lago Nahuel Huapí and the extension to Valdivia, Chile, including the Andean lake district. Text and maps by the Comisión de Estudios Hidrológicos. Bailey Willis, Director, 1911-14. 464 pp. Maps, ills., index and maps in separate case. Ministry of Public Works, Argentine Republic. Charles Scribner's Sons, New York, 1914. $6, postage extra. Maps in separate case, $2. 10 x 7.

[2] An abstract of this paper (with a map) was published in the *Bulletin* (Vol. 45, 1913, pp. 357-359. Since then he has published a closely organized and illuminating account of the geographic problems of Argentina under the title, "The Physical Basis of the Argentine Nation" (Latin America; Clark University Addresses, November, 1913; edited by G. H. Blakeslee, 1914; pp. 342-359). In addition there have been published "The Forty-First Parallel Survey of Argentina" and "Physiography of the Cordillera de los Andes between Latitudes 39° and 44° South" in the *Compte Rendu* of the Twelfth International Geological Congress of 1913 (published in 1914). pp. 713-731 and 733-756. respectively.

Argentine Government is not in position to continue the publications. Manuscript reports and maps, representing a considerable cost and of high value to the future of the country, remain to be published.

It is difficult to exaggerate the importance of these clear-cut, authoritative interpretations of the geography and geology of the forty-first parallel south. The region was not by any means unexplored; it has been visited by at least a round dozen of explorers in the last hundred years, and parts of it have been studied in moderate detail. Mr. Willis's work is distinctive in that he has a basis of accurate topographic surveys, an extraordinarily wide range of previous experience, and that critical spirit so necessary for the testing of rival theories of origin. Moreover, his results in land classification are essentially geographic throughout. A comparable piece of work does not exist for any other part of South America. The climax of interest is reached in the fact that no part of Argentina has a more favorable climate for peoples accustomed to the temperate zone than the region about Lake Nahuel Huapí. The favorable conjunction of these many lines of interesting investigation lends to his work the highest distinction.

In the following paragraphs we shall outline only the principal points of geographic interest.

Organization and Scope of Surveys

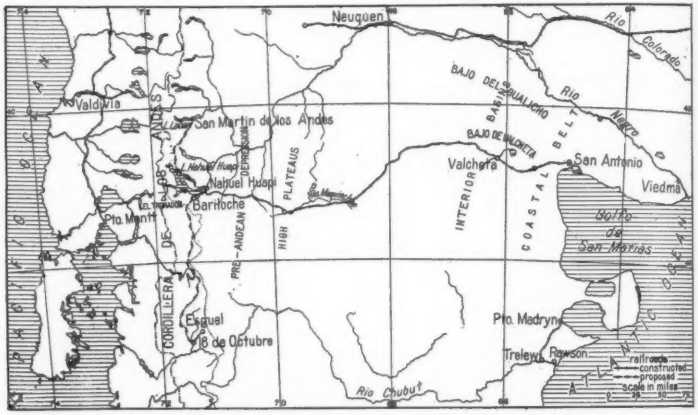
The forty-first parallel survey of South America was organized in January, 1914, under the Minister of Public Works of the Argentine Republic. It was designed primarily for the study of water supplies with the hope that the semi-arid region in which railroad construction was in progress might yield water in sufficient quantity to serve the purposes of the railway and of settlement. It was found that the geologic structure was unfavorable to the accumulation of artesian waters, and therefore the attention of the commission was directed to the problem of water storage and of canals to conduct the water to desirable localities. In the subsequent development of the surveys the Cordillera of the Andes was explored for routes of communication, for centers of settlement, for its resources of water supplies and forests, and the land was classified according to its future use. It will be seen, therefore, that the survey consisted of the investigation of a group of problems in economic geography. Field work was prosecuted vigorously until April, 1913, the operations being carried on in different districts according to the season. The topographic surveys were executed by Emilio E. Frey, C. L. Nelson, W. B. Lewis, C. F. Eberly, and J. S. Mercer; the geologists were Bailey Willis, J. R. Pemberton, and C. W. Washburne; the economic geography was studied by Messrs. Willis, Pemberton, and W. D. Jones; railroad surveys were made by D. L. Reaburn and J. G. Morgan. Arrangements were made with the government for enlarging the scope of the work with the beginning of 1914. But in 1914 the plans were interfered with by changes in the administration and by the difficult economic situation of the country as a whole. Finally the Commision de Estudios Hidrológicos was disbanded June 30, 1914, except that a single engineer continued topographic surveying up to the end of the year.

During the first four months of 1914 field work was carried on about Lago Nahuel Huapí by Señor Frey, by Messrs. W. B. Lewis and O. G. Taylor, topographers of the U. S. Geological Survey, and J. S. Mercer. The last named made an excellent map (not yet engraved) of El Tronador, the snow peak

that dominates the region, and determined the altitude to be 3,555 meters (11,663 feet), rather than 3,460 meters as heretofore given.

"Our principal work was directed to intensifying the studies of the future cities Bariloche, the tourist center, and Nahuel Huapí, the industrial railway terminus of the national trans-continental line across Patagonia. Large-scale, detailed maps were made of the sites, and also of dam sites, etc., to serve as a basis for city planning and development of water supply and power."

The results of these studies seemed likely to be buried in the Argentine archives for the President was wisely insisting on the severest economy. Through the active interest of a group of public officials, all men of sound practical statesmanship, an arrangement was consummated by which Mr. Willis was authorized to prepare manuscript reports in the United States, and these reports are to be the sequel to "Northern Patagonia."



Sketch map of Northern Patagonia showing the features mentioned in the text. Based on the general map accompanying Bailey Willis's "Northern Patagonia." Scale, 1:9,000,000. Where not coinciding with the Chile-Argentina boundary, the Pacific-Atlantic divide is indicated by a dotted line.

"The extensions of railways in the Patagonian Andes are to be worked up; the development of the Patagonian Switzerland as a National Park is to be studied; the detailed plan of the City of Nahuel Huapí to provide for its anticipated activities in manufactures, business, residence, and education, is to be designed, and the program is to include the writing up of the general geology, so far as our observations permit." (Letter from Willis.)

Physiography

The Eastern Pampas. Northern Patagonia falls broadly into two distinct physiographic provinces—the treeless pampas of the east and the heavily forested Cordillera of the Andes on the west. The former is semi-arid; the latter has an abundant rainfall and resources of climate and soil sufficient to support a dense population.

The pampa region falls into four districts. Named in order westward from the Atlantic coast they are as follows: the *coastal belt,* the district of

interior basins, the *high plateaus*, and the *pre-Andean depression*. The *coastal belt* near San Antonio is low and bordered seaward by cliffs, from the top of which there extends westward a rising plain with moderate gradients. This plain has been warped so that the immediate San Antonio district is a depressed area with reference to the surrounding lands with steeper gradients. It is one of a family of depressions in Northern Patagonia, some of them of great extent and without outlets and designated by the descriptive Spanish name of *bajos*. Beside the major basins there are innumerable small basins which form transient ponds during the rainy season and which are due to wind erosion. The plain is made up of porous gravels which, in the semi-arid climate of the region, support desert shrubs and certain grasses that afford excellent pasture.

West of the *coastal belt* is a great *depression* called the "Bajo de Valcheta." It is bordered on the southwest by a *plateau* capped by heavy lava flows, and from this plateau several streams run northeast into the depression, where they are lost in gravel beds or form salt lakes and evaporate.

North of the forty-first parallel the district of the interior basins sinks to much lower elevations and in the Bajo del Gualicho, or Devil's Deep, a depression of great length south of the Rio Negro, it drops to thirty meters (98½ feet) below sea level. The surface is covered by wind-blown material or by alluvial deposits, marked by salt plains, sand dunes and gravelly stretches. It has a distinctly desert aspect. Surface water is scarce and that found in wells is commonly salt.

At the season of rains or melting snows the exceedingly irregular surface of the lava plateau is covered with ponds whose waters sink into the crevices in the deep lava mass. The fissures become narrower below, so that, though the water is received quickly, it is delivered slowly. Thus the run-off on the plateaus is small and evaporation is small and delivery correspondingly large. The inverse holds true with the plains, where the amount of evaporation is large and the run-off is large. The lava field is therefore a great reservoir for water upon which the population of the border region must depend, though the lava country is itself too stony and too high for cultivation.

The size of the streams and the continuity of their flow depend upon the capacity of the plateaus from which they derive their supplies and also upon the capacity to deliver it, in concentrated form, in a large stream with more or less steadiness throughout the year. Where there are no lava plateaus there are no considerable streams.

West of the Bajo de Valcheta and about 200 kilometers (124 miles) west of San Antonio is a hilly region, where the only possibilities for human life grow out of the springs that issue from the bases of the lava remnants and that support irrigation to a limited degree.

Still farther west, and 380 kilometers (186½ miles) from San Antonio, the elevation is 900 meters (2,953 feet) above the sea. We are here in the Maquinchao valley, which is the site of an English estancia (ranch) 600,000 acres in extent, which will eventually be settled by a community dependent upon the waters of the stream to irrigate the rich valley lands. It is a semi-arid region, with a distinctly variable rainfall. Other gorges and depressions, with limited possibilities for pastures not too high for winter grazing, continue the high plateaus westward to the next physiographic province.

The district of the *high plateaus* is from 1,000 to 1,200 meters (3,280 to 3,940 feet), and in places 1,600 meters (5,250 feet) above the sea. It is a broad

elevated plain, cut by deep valleys and surmounted by mountain peaks distributed singly or in groups, and easily traversed in various directions by many passes. The valleys, though generally wide, narrow in many places to mere gateways or to impassable gorges. Parts of it are very picturesque and varied in profile and color.

The *pre-Andean depression* extends along the eastern front of the Andean Cordillera and is due to continental warping. It is not a continuous trough, since it has been filled in by volcanic material from local centers of eruption and by glacial formations derived from the west, and both classes of material have been more or less eroded according to their age. The trough is bordered on the east by the high plateaus which extend parallel to and at almost the same elevation as the Cordillera itself. It is occupied by various rivers whose courses were determined by orogenic depression. The rivers have sunk their channels in the original structural valley floors and in places flow in canyons bounded by rocky walls.

The Cordillera de los Andes between Latitudes 39° and 44° South. The Patagonian Cordillera between 39° and 44° south is not a mountain ridge, but a broad mountain zone wherein the summits rise in general to a common, nearly uniform, altitude above the sea. It has numerous lakes, many of them of notable size and beauty. It is traversed by faults which run longitudinally and have given rise to certain longitudinal valleys which lie between the Eastern and Western Cordilleras. There is no evidence of transverse faults. In the analysis of the topography it is necessary to distinguish between the effects of faulting, or erosion by streams, of stream capture, of erosion and damming by glaciers, etc.

Mr. Willis recognizes the following physiographic epochs: (1) epoch of mature erosion and low relief expressed in the highest summits and valleys; (2) epoch of elevation and deep canyon-cutting; (3) epoch of early glaciation; (4) inter-Glacial epoch; (5) epoch of latest glaciation; (6) post-Glacial or present epoch.

From 1,200 to 1,690 meters (3,940 to 5,250 feet) above the sea in the mountain zone one may recognize a well-marked topographic unconformity. Below this level are the immature canyon walls; above are the mature valleys and divides. The mature valleys run, finally, to sharp ridges, acute peaks, and to somewhat extensive plateaus of structural rather than of erosional origin. Residual deposits still remain on the eastern mountains in places, but in general have been replaced by glacial deposits. For reasons too complex to discuss here the age of this mature surface is assigned to the Pliocene. The local relief of the mature surface amounts to 500 meters (1,640 feet) between hilltops on the one hand and nearby valleys on the other. The surface is, therefore, not a plain, in spite of the uniformity of summit altitudes. In favorable situations the eye may discern many spurs so related to each other in form and slope as to represent a former extensive surface now rendered discontinuous because of the development of recent canyons and ravines.

If this surface be traced eastward, it may be seen passing into the surface of gravel deposits which cap the eastern mesas. In places the gravels lie upon summits formed of horizontally bedded lavas, but in many other cases they lie upon metamorphic rocks and granite carved into an ancient surface of erosion. Many of the striking topographic features are of more recent origin than the gentle profiles that, from a physiographic standpoint, dominate the landscape.

Thus Mount Tronador is a volcanic peak which rests upon a granite basement 1,600 to 2,000 meters (5,250 to 6,562 feet) above the sea. The flows of the volcano filled ancient valleys and were disposed upon an ancient surface. The partial destruction of the ancient surface has, therefore, taken place by stream erosion and its partial burial by accumulations of volcanic lava.

In the upraising of the Andean belt to the altitude which it now has, the process of elevation was gradual and was accompanied by elaborate changes in the drainage system. The width of the Andes at latitude 41° 30′ is about 100 kilometers (62 statute miles). A fault marked by a central valley divides the Cordillera into an eastern and a western portion. On each of the two flanks of this flat-topped mountain belt the surface was flexed into a monocline by which the plateau-like summit was connected with the lower surfaces on either side. The descent on the western slope is 2,000 meters (6,562 feet); that on the eastern into the pre-Andean depression is 600 to 800 meters (1,968 to 2,625 feet).

In the process of elevation the normal fault which now bounds the central valley along its eastern side developed across the courses of certain Atlantic rivers at right angles to them and broke the streams in two. Their headwaters were thus diverted into the central valley and being captured by Pacific streams became tributaries of that ocean. The effect was to fix the passes on the Eastern and Western Cordillera nearly as they now exist, leaving sections of the old valleys in the wide flats that saddle the mountain ridges on either side of the central depression. The pronounced elevation of the Western Cordillera above the downthrown fault block of the central valley has accelerated the streams of the eastern slopes of the Western Cordillera so that the Atlantic drainage probably encroached upon the Pacific in the early stage of drainage readjustment. But the advantage of nearness to the Pacific and considerable elevation above it gave the short Pacific streams the opportunity of finally encroaching upon the Atlantic drainage.

After the range had attained an altitude very nearly that which it now has, a climatic change resulted in the development of extensive glaciers. The most notable effect of this early glaciation was the excavation of lake basins which transformed sections of many of the canyons into very deep lakes—the most conspicuous feature of the map of the southern Andes. The glaciers originated in headwater amphitheaters from 1,500 to 2,000 meters (4,920 to 6,560 feet) above the sea and were conducted by the channels of the minor canyons into the main canyon of each system. The effect was to concentrate an enormous volume of ice, which was carried forward under a head of about 500 to 1,000 meters (1,640 to 3,280 feet). This corraded the rock deeply and upon the retreat of the glaciers left rock-bound basins. One of the effects of the earliest glaciation was to throw loop-moraines across the valleys occupied by ice, thus causing some disturbance of the drainage.

The earlier glacial epoch was succeeded by a long interval of milder climate, during which the glaciers retreated to the highest summits of the Andes or entirely disappeared. In the interval since then the moraines of the earlier period have been remodelled superficially, so that they no longer display the typical features of glacial topography and their materials have decayed to a notable degree. The interglacial interval was succeeded by a fresh advance of the ice, so that many of the lakes are dammed by glacial moraines of the later epoch. In some cases the later moraines became a part of the continental

divide, turning the lake waters back of them into the Pacific drainage. In other cases the lake waters rose to a notch on the border of a moraine and occupied a channel deep-cut in rock. The latest glaciation of all was by no means so extensive as the earlier and has produced no pronounced changes.

Human Geography

Turning to the human geography in Mr. Willis's publications, we find an unusually rich collection of data on the climatology, the resources, the distribution of people, and the possibilities of future development. The introductory chapter which deals with the general geography of Patagonia we dare say will long be a standard work on that country. Moreover, a very clear picture is drawn of the relations of the still remote region of Patagonia and the more densely populated provinces along the Paraná. It is especially satisfactory to note the section on the conservation of soils and water supply in the Argentine domain.

"Exploitation and conservation are by many considered to be contradictory terms, exploitation being taken to mean exhaustive utilization for immediate profit, and conservation representing the idea of preservation for future use. But this view has often been shown to be incorrect. Exploitation of natural resources with due regard for prevention of waste and reproduction of crops is conservation. Conservation means that that which is ripe shall be used, whereas that which is not ripe shall be neither used nor destroyed but shall await the time of maturity. This applies to all things that grow, to grass and to trees. The things that do not grow, such as soil and waters, are conserved in preventing their waste and promoting their highest utilization."

In the application of this principle special attention is paid to the forests of Argentina, their protection against fire, the necessity of police patrol to prevent injury from the wandering cattle herder, and the commercial development of their useful timber so as not to destroy the water supply for the bordering population groups.

There is no other resource of equal importance with water in Argentina. It is distinctly a problem in conservation to make topographic and hydrographic studies so that definite information of the nature and conditions of the supply of water may be secured. Likewise grazing demands a better knowledge of the grazing plants now available, their nutritive value, relative abundance, and other characteristics bearing on their use as fodder plants.

Some notes on the climate of Patagonia are of interest in view of the general ignorance in this country of the excellent reports by Walter G. Davis of the Argentine Meteorological Office. We are, of course, familiar with the contrast between the eastern and western sides of the Andes, but we are not all familiar with the degree of contrast. In the narrow Andean zone the annual precipitation diminishes from 3,000 millimeters or more in the mountains to 1,000 or 800 millimeters at the eastern margin, and to 600-200 millimeters over the plateaus of Patagonia. Both rain and snow have a distribution opposed to that of temperature for the greater precipitation is in the colder districts, and the lesser in the warmer northeastern districts; that is, the central and northern parts of Patagonia, midway between the Atlantic and the Cordillera, have the highest summer temperature and the least rainfall. Southward along the Atlantic margin the rains increase gradually and the temperature is lower. In passing from east to west there is a change from light and infrequent snowfall on the coast to heavy, and, in the alpine zone, permanent snowfall in the Andes. In latitude 41°, from 2,000 to 2,500 meters (6,562 to 8,200 feet)

high, the mountains support permanent snow fields and the farther south one goes the more extensive become the glaciers.

The transition between the heavy snowfall of the Cordillera and the light snowfall of the Pampa region is so sudden that stock may be driven down from the region of snow to the region of light snow or no snow at all in a very short space of time and, for the most part, snows do not create a serious obstacle to the wintering of livestock in the pampas even in the far south.

The treeless plains and plateaus of Patagonia offer no obstruction to the air currents that cascade down from the Andean heights. Evaporation is high and there is, therefore, a high degree of physiological dryness. Animals and even men likewise suffer from the wind.

Special interest attaches to the detailed description of the economic resources along the line of the new railroad that stretches westward from San Antonio. The bay of San Antonio, on the Atlantic coast, is an excellent port. At the other end of the line nearing completion, is Lago Nahuel Huapí, a lake of great scenic and historic interest, and one that lies in the center of a potentially rich though still unsettled agricultural region. The trunk line of the railroad is 630 kilometers (391½ miles) long. Its position was determined by topographic conditions; had it been located farther north it would have been too near the valley of the Rio Negro and would have been obliged to cross the very arid Bajo del Gualicho; located farther south it would have had to pass a group of high plateaus. Moreover, the line selected passes through a zone of more available water supply. The first hundred kilometers (62 miles) cross a high coastal plain where permanent settlements must always be few on account of deficient water supply. The next 110 kilometers (68 miles) pass through a section where a group of gorges and valleys are drained by streams along whose floors agriculture may be developed and a resident population established. The third section, 170 kilometers (95½ miles) in length, has grazing possibilities, but the settlements will be restricted to scattered ranch houses. Farther west the road enters the district of the interior valleys capable of development as irrigation districts and of supporting agricultural population, but having extensive tributary grazing areas. Westward from a point 480 kilometers (298 miles) west of San Antonio the route runs across the high plateau country, interrupted by narrow tortuous valleys, among hills and plateaus favorably conditioned for grazing. Agriculture can be developed only as an auxiliary industry and in small areas of valley lands. Beyond the plateaus is a region of lesser relief and with increased opportunities for irrigation and settlement.

Summarizing, we may say that the resources along the line of the railroad are chiefly pastoral. The freight will consist of wool, meat, hides, bones and alfalfa or other hay suitable for sheep and cattle.

At its western end the trunk line touches a very different country, the lake and valley region of the Andes. Here the conditions are favorable for the establishment of a numerous and vigorous population and here is the chief justification for so extensive a railroad.

The city of Nahuel Haupí is destined to become a manufacturing center for supplying the needs of the agricultural people of the northern provinces. The raw materials will be transported over the trunk line to San Antonio for shipment by water to the largest centers of distribution: Buenos Aires, Rosario, etc. Moreover, on the Andean border and south of Lake Nahuel Huapí are

agricultural valleys and centers of population suitable for cattle raising and dairying, and all of the products will find an outlet over the same line provided that branches are extended north and south of the lake.

Two branches within the Cordillera are proposed. One runs south to Esguel, the principal town in the colony of the 16th of October. It will be 312 kilometers (194 miles) long and will pass through the center of the longitudinal valley of the Andes. In addition to the natural resources are the beautiful lakes and snow peaks and the attractive scenery that should develop an extensive tourist travel. At present the valleys are occupied by Chilean squatters and the mountain slopes are ranged by their herds of cattle. It is a region that can be made tributary to Lago Nahuel Huapí and the east, though at the present time the more practicable routes of travel lead westward into Chile.

A northern branch of the San Antonio railroad would lead to San Martin de los Andes at the head of Lago Lacar, 650 meters (2,132 feet) above the sea.

Many attempts have been made to find potable water in various parts of Patagonia and deep wells have been drilled at San Antonio Oeste and La Travesía, 62 kilometers (38½ miles) west of San Antonio. Both wells penetrated sand and gravel and at 105 and 67 meters (344 and 220 feet) respectively, entered the complex of granite and metamorphic rocks which forms the mass of the old continent. Small flows of more or less brackish water were encountered and additional wells were not thought practicable. At Puerto Madryn a well has been drilled 700 meters (2,297 feet) deep in sedimentary strata, to the underlying granite, but without satisfactory results. Throughout the coastal plain various water-bearing layers have been encountered at depths of fifty to a hundred meters. In some places both fresh and salt water may be encountered at different depths in one and the same well.

The determination of the conditions of water supply in the basins of northern Patagonia is rendered very difficult by the high percentage of salt which the underground waters carry. Fresh ground water may rarely be found except on slopes or on the higher plains and plateaus.

The grazing industry has been established in Patagonia for about twenty-five years and has spread until now nearly all the ranges are occupied and the more accessible or desirable ranges are overstocked. The undirected occupation of the ranges is typically nomadic. The flocks graze all summer in the valleys where they must feed all winter. This is done on the ground that the nomadic herdsman occupying public land has no right to the range he occupies, hence if he leaves it, he loses it. The result is an uneconomic use of the pasture. Moreover, many squatters are men of little means—Indians, half-breeds, or poor frontiersmen, whose livelihood is in their flocks. Others are wealthy sheep owners who secure large returns on capital invested. They, too, have little concern for the future of the ranges, though many of them are sufficiently powerful to retain absolute possession year after year and some even fence the Government land or put up substantial buildings on it. Up to 1913 these flocks had increased on the public lands without paying taxes, but there is now a tax of 4 cents gold a head on sheep and 20 cents a head on cattle or horses annually.

It is time to substitute intelligent direction and foresight for careless and irresponsible grazing.

"Flocks should so migrate from season to season that they may feed upon the ranges now abandoned to the guanaco and the ostrich when grass and water

are abundant and return to the more constant pastures after the seed time of the pasture plants. The stockman must set aside the careless assumption that grass will grow year after year from the old roots, although it be nibbled down before the seed sets, again nibbled down when the young shoots sprout with the first rains, and kept nibbled down through rain and drought alike. It should be recognized that as the edible plants diminish the useless ones spread —that it is possible to change the flora of the region materially, to substitute the thorny and the bitter for the sweet and nutritious. All owners should realize that the pasture of the range is their capital, and that when it is being diminished by overgrazing, dividends are being paid from capital.

"In spite of the fact that the ranges have been exploited without care for a quarter of a century, they continue to support increasing numbers of sheep, together with a smaller proportion of horses and cattle. The persistence of the native pasture is thus well demonstrated and its capacity when it shall be intelligently managed may confidently be estimated as much greater than that which it now has."

Since the water supply for stock is a controlling factor in the use of the ranges and in the determination of their value, each lessee ought to have his boundary determined in such a way that he may control a just share of the water of the country. The isolation of areas from the water supply should be made impossible. The region should be divided into large blocks, each of which should contain a proper proportion of winter and summer ranges and a reasonable proportion of the water. It goes without saying that this requires careful surveys and the detailed classification of the land. In general the winter pastures should lie in the plains and the summer pastures in the mountains.

In the Cordillera on the west are (1) eastern ranges suitable for pasturing sheep throughout the year, and (2) wooded western ranges where cattle may graze in summer on the wooded slopes and alpine pastures and where in winter they may descend to the deeper valleys on the bordering plains. Where the snow is not too heavy and where the underbrush affords shelter from the storms and the winds, cattle may very often remain in the forests even in winter. This allows each type of range a chance to recover and to seed itself naturally.

The third section of the book deals with the resources of the Andes between latitudes 39° and 44° S. Of special interest are the maps that accompany this section and which designate the location and extent of the agricultural lands, the disposition of the grass-covered country, and the distinction between burned-over land and brushy mountain slope on the one hand and virgin forests and the alpine country on the other. The forests and water power of the Cordillera, the possibilities for the development of future cities, and several appendices on the meteorology and the quality of certain Argentine woods, close this admirable report on a part of Argentina which is capable of a larger future development than any other section of the country.

It would be inadvisable to go into detail, in this place, into the many interesting geographic questions raised in Mr. Willis's book, "Northern Patagonia." We must conclude by merely calling attention to such excellent paragraphs as those that deal with the grazing problems, the mountain resources, and the forests and pastures of the Cordillera. Especially do we wish to comment on the compact paragraphs on settlements and their relation to each other and the discussion of those problems in economic geography which the development of the region entails.

GEOGRAPHIC NOTES ON THE WAR

By DOUGLAS W. JOHNSON

In two previous issues of the *Bulletin* I have discussed at some length the physiographic aspects of the western and eastern theaters of war, and have noted some of the effects of topography upon army movements during the first seven months of the conflict. On the basis of these earlier discussions we may profitably consider the geographic aspects of successive stages in the principal campaigns. The two events which claim our attention this month are: (1) Von Hindenburg's latest drive in East Prussia, and (2) the Russian retreat in Bukowina.

Von Hindenburg's East Prussian Drive. There are many features which arrest the attention of the geographer as he follows the reports of Von Hindenburg's latest advance and subsequent partial retreat. As was briefly mentioned in my last article, the Russians had for many weeks maintained their position along the east side of the topographic barrier formed by the Angerapp River and the chain of large lakes farther south, when a concentration of enormously superior forces in East Prussia permitted a vigorous German offensive which drove the Russians back to the defensive line of the Niemen-Bobr-Narew. To appreciate the probable significance of this move, and thus to judge of the extent of its success, we must review certain features of the local geography.

The possession of Warsaw has long been coveted by the German General Staff, both because of its strategic importance as a railway center and a point for crossing the Vistula, and because of the political importance of the Polish capital. To achieve the capture of the city von Hindenburg has vainly sacrificed tens of thousands of lives in repeated and spectacular direct assaults from the west. An alternative plan of indirectly reducing the city by severing its communication with the main part of Russia may well have appealed to him in view of the failure of direct attacks. The most direct railway line between Warsaw and Petrograd passes within forty-five miles of the East Prussian border, and to sever this important line of communications would be a long step toward the reduction of Warsaw.

Between the German armies in East Prussia and the coveted railway there was first the fortified line of the Russians along the Angerapp River–Mazurian Lakes barrier; but farther back and far more important was the great natural barrier formed by the Niemen, Bobr, and Narew Rivers with their associated marshes. The north-south trench of the Niemen, protected by the fortresses of Kovno and Grodno at the north and south respectively, has already been described. Near Kovno the river is perhaps a quarter of a mile broad, and everywhere throughout this portion of its course is a formidable obstacle. From a short distance west of Grodno the river Bobr flows in a southwesterly direction, continuing the defensive line until it joins the Narew, after which the barrier consists of the Narew as far as its junction with the Bug, and of the Bug for the short remaining distance to the Vistula. The Bobr, in spite of its small size, is a very difficult obstacle to cross. Broad marshes flank it on either side, the belt of wet country sometimes reaching a breadth of many miles. The Narew is a meandering river of larger volume, bordered by numerous abandoned meander channels or oxbow lakes, and likewise flanked on either side by broad areas of difficult marshes.

In order to render this natural obstacle still more formidable, the Russians have erected imposing fortifications at various points along the line. The most important are Kovno at the northern extremity; Grodno at the south end of the Niemen trench, and near the short gap in the barrier which inter-

venes between the Niemen and the Bobr; Ossowiec on that portion of the Bobr most easily reached from Prussian territory; and Novo Georgievsk at the western extremity of the line. Olita, Lomza, Ostrolenka, Rozan, Pultusk and Serock are smaller fortifications erected at intervening points along this river-marsh barrier. When we remember that temporary fortifications and trenches built since the war began have still further strengthened a line made exceptionally strong by nature, we can understand why two great German offensive movements have broken down when this line was reached.

It will be remembered that the morainic belt of hills and lakes runs eastward through East Prussia, toward the Niemen. Apparently von Hindenburg sought to avoid this difficult topography when he launched his main offensive

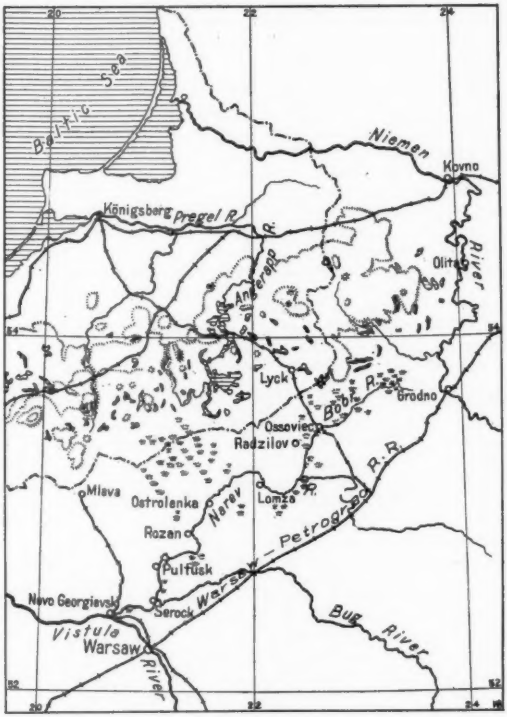


FIG. 1.

across more level country to the north and south, and proceeded with a rapidity that would have been impossible in the region of the hills. In this connection it is interesting to note that the Russians maintained their position at Lyck, in the more difficult topography, for some time after they had been driven far back across the more level lands on either side. On the other hand, retreat is more dangerous for a disorganized force where lakes and marshes obstruct the way; and some of the largest captures made by the Germans seem to have taken place in the marshy forests at the eastern end of the morainic belt.

Ossowiec is the point on the topographic barrier most easily reached by the Germans, and was besieged both during the earlier and later German attacks on this line. The only railway between the western extremity of the Niemen-Bobr-Narew line and Grodno runs from Lyck in East Prussia to Ossowiec, and continues southward to the Petrograd-Warsaw railway. This line enabled the Germans to bring their heavy siege artillery right up to the barrier they wished to break through and to supply the forces attacking the Ossowiec forts. If successful in reducing the forts, they could continue along the railway to break the Petrograd-Warsaw line of communication. Fortunately for the Russians, the natural barrier is especially strong in the vicinity of Ossowiec. Broad marshes on either side make it difficult for an enemy completely to invest the fortress. The moving and placing of guns is difficult in marshy land and it is reported that after some of the guns were brought up within range of the forts, they had to be taken farther back to find satisfactory positions on dry ground, especially as a thaw had rendered the marshes more dangerous. Entrenching in a marsh is almost impossible; and heavy siege guns in marshy land are liable to capture by sorties from the fortress if unprotected by well-intrenched infantry. If we may believe the reports from this district, some of the guns intended to reduce the fortress were moved west to the dry ground around Radzilow for safety, while others were caught in the marsh by the thaw and could not be removed. For a second time the topographic difficulties of the Ossowiec district contributed largely toward rendering the German siege a failure.

So far as I have been able to learn from the reports thus far received, the Germans succeeded in breaking the Niemen-Bobr-Narew barrier at but one point. This was just north of Grodno, where German troops crossed to the east bank of the Niemen in considerable numbers. It has been stated that the eastern extension of the Augusto forest, reaching to the river at this point, afforded sufficient protection to the Germans to enable them to force a crossing along a front some twelve or fifteen miles in length. It should be noted that here the Petrograd-Warsaw railroad lies very close to the river-marsh barrier. The breach was too narrow, however, to permit any extended eastward advance; and failing to widen it, the Germans were forced to retreat. Russian armies which had taken up defensive positions behind the barrier gradually resumed the offensive, and pushed the Germans back toward the Prussian border all along the line. The German offensive had failed to pierce the railway line behind the fortified natural barrier, and Warsaw was safe. Russian armies suffered great losses during a retreat made more difficult by bad weather conditions; but the German losses were likewise very high, and while East Prussia was freed from the invader, the strategic position of the German armies was probably not improved by the advance beyond their own strong defensive position on the west side of the river and lake barrier in East Prussia.

Russian Retreat from Bukowina. From the crest of the Carpathians between Bukowina and Transylvania the Russian armies have retreated before superior Austro-German forces nearly to the deep gorge of the lower Dniester River. A movement like this, occurring at the same time as the German advance from East Prussia, suggests an attempt to out-flank the entire Russian line by bending back both wings. The great length of the line, however, would make this impossible; and we must seek a more local explanation for the movement in Bukowina, just as we did for that on the other end of the line. A consideration of the physiography suggests a plausible explanation for the campaign undertaken by the Austrians, in addition to the political necessity of showing the Rumanians that the Teutonic allies were too strong to make the invasion of Transylvania possible.

We have already seen that parallel to the Carpathian crest, and lying in the trough formed by the Carpathian piedmont and the back slope of the Podolian cuesta, is the deep-cut gorge of the lower Dniester. Parallel to the gorge and nearer the mountains is the broad lowland of the Pruth River, with Kolomea near its western and Czernowitz near its eastern end. Northwest of Kolomea transverse rivers flow from the crest of the mountains out to the Dniester, whose upper course lies on a broad, marshy valley floor.

If superior Austro-German forces could drive the Russians from the eastern Carpathian passes back through Bukowina and across the gorge of the Dniester, a much smaller force could hold them at bay along this natural barrier while the bulk of the Teutonic armies turned northwestward to cut the lines of communications behind the Russians still remaining in the mountains farther west, compelling them in turn to fall back behind the marshy barrier of the upper Dniester to avoid disaster. Could this process be carried far enough, the oil fields of the Drohobycz region would be recovered, and the siege of Przemysl raised. The transverse valleys from the mountain crest to the Dniester would of course be seized upon by the Russians as defensive lines to prevent the flanking of the armies still in the passes; on the other hand, they would serve to protect the Austro-German armies in case their attack failed and the Russians assumed the offensive.

What actually happened was this: The Russians were forced back to the north side of the Pruth lowland before they were able to make a successful stand against the heavily reinforced armies of their enemy. In places they even appear to have retired their main line to the northeast bank of the Dniester. On the other hand, it seems pretty certain that the Austro-Germans failed to drive the Russian left wing as a whole back of this barrier. Russian forces lined up along the minor barriers formed by the transverse valleys connected the retired Russian left wing with the advanced position of the main army on the crest of the Carpathians, and prevented a Teutonic advance from the southeast toward Drohobyzc and Przemysl. Bukowina was practically cleared of Russian forces and the menace of Rumanian intervention removed for the time being; but the Russian armies were not forced behind a natural barrier where they could be held in check by inferior forces, and the relief of Przemysl from the southeast was not made possible.

THE DEFINITE SURVEY OF THE RIO THEODORO

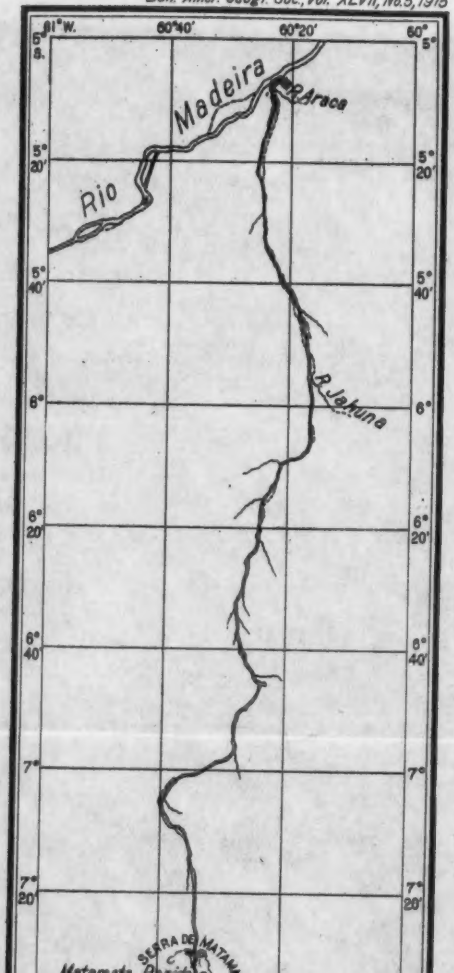
(Map facing p. 362)

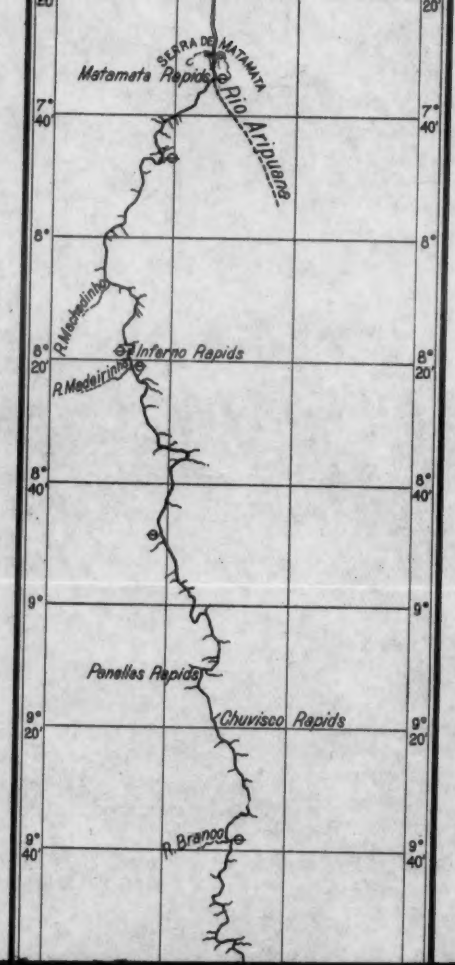
Ever since the announcement, a year ago, of the descent of the "Rio da Dúvida" by the Roosevelt-Rondon expedition, geographers have awaited with interest the publication of the definite survey of the river. The maps appearing in Colonel Roosevelt's narrative in *Scribner's Magazine* and subsequently in his book (reviewed in the March *Bulletin*, pp. 216-217) were either mere sketches or else on too small a scale to be of value. The definite survey has now been published in the *Geographical Journal* for February, 1915. The map is on the scale 1:400,000 and is based on a manuscript map in 1:200,000 prepared from the compass traverse of Lieutenants J. S. Lyra and Pyrineos de Sousa, the two Brazilian army officers who had charge of the survey. The traverse is adjusted to the astronomically determined position of the starting point of the expedition on the river (12°1′ S. and 60°15′ W.) and to the position of the junction of the river with the Madeira as laid down on U. S. Hydrographic Office Chart No. 894 (5°7′ S. and 60°23′ W.). Latitude observations were made at thirteen points along the river, *viz.:* 11°44′, 11°23′, 11°22′, 11°18′, 11°12′, 10°58′, 10°24′, 9°38′, 8°49′ 8°21′, 8°19′, 7°47′, 7°34′. The map in the *Geographical Journal*, due to its large scale and the extension of the river over nearly seven degrees of latitude, is divided up into sections. In the reduction to 1:2,000,000 presented herewith it has been possible to show the whole river as a unit. Only the more important tributaries and

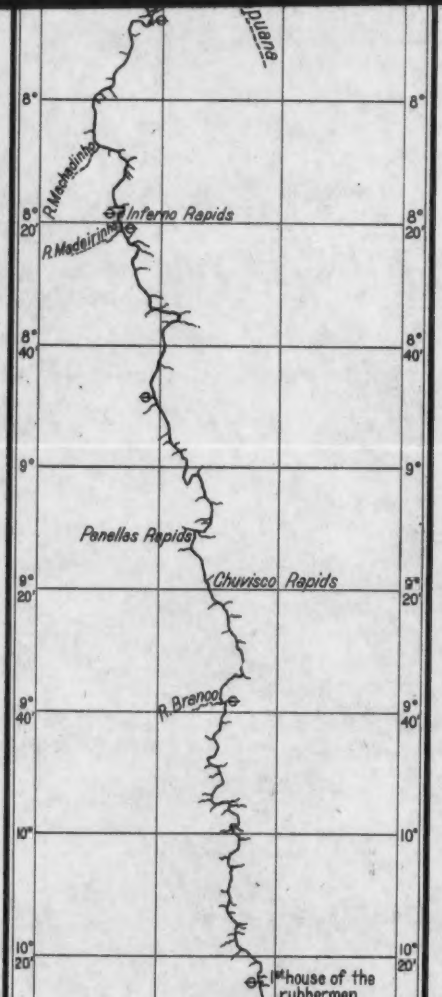
rapids are named. Its relation to the hydrography of the Amazon Basin can be seen by referring to the general map which accompanies the discussion of its exploration in the *Bulletin* for July, 1914, (Vol. 46, pp. 512-519).

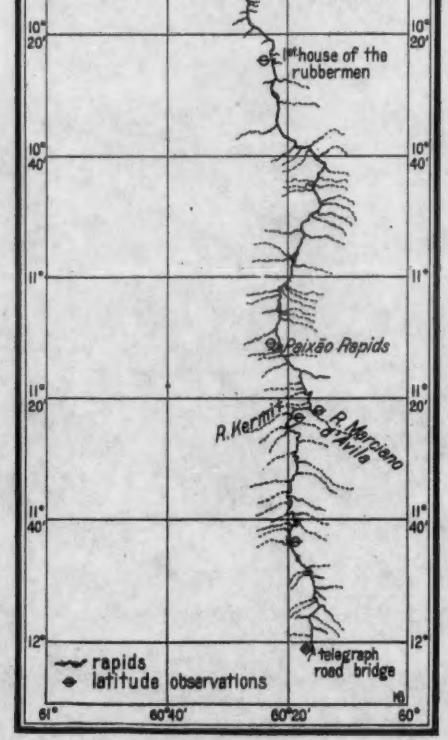
The statements made on that occasion require correction in two particulars. The Aripuana is a right and not a left affluent. The last rapids do not lie in 10°24′ but in 7°30′ S. The latter point establishes the fact that there is no interruption here in the even outline of the boundary between the Brazilian Highlands and the Amazon Lowlands (see *loc. cit.*, pp. 518-519). The survey well brings out the difference in character of the river in these two natural provinces: wide and free-swinging in the alluvial lowland below, narrower, tortuous, and rapid-obstructed in the highland above. The border of the highland is designated on the map "Serra de Matamata." The highland section of the river may further be subdivided into two parts at about 10°35′, the great number of small tributaries above this point indicating that this part of its course lies in the higher Serra dos Parecís, the western extension of the Matto Grosso Plateau.

A word as to the name of the river may not be amiss. The *seringueiros*, to whom it was known as far upstream as 10½° S., considered the upper course, above 7½°, as a branch only, calling it the Castanha, while by Aripuana they designated the right affluent here so called, together with the lower course, below 7½°, considering this continuous waterway to be the main stream. On the Roosevelt-Rondon expedition, as soon as its importance was realized, the river was formally christened "Rio Roosevelt" by Colonel Rondon on orders received from the Brazilian Government before his departure. Subsequently—because of the difficulty of pronunciation for Brazilians, it is understood—Colonel Roosevelt's Christian name was substituted. On two of the maps accompanying Colonel Roosevelt's book this name is given as "Rio Téodoro". This is the Spanish form; in Portuguese the name would be Rio Theodoro. As the Portuguese names throughout the book are not always correctly rendered, it does not seem unreasonable to suppose that "Rio Theodoro" is the correct version and that the newly discovered river is to be known by that name.


61° W.
60°40'
60°20'
60°
5° S.
5°
5° 20'
5° 40'
6°
6° 20'
6° 40'
7°
7° 20'
Madeira
R. Aracá
Rio
R. Jahuna
SERRA DE MATAM


SERRA DE MATAMATA
Matamata Rapids
RIO Arinuana
R. Machadinho
Inferno Rapids
R. Madeirinha
Panelles Rapids
Chuvisco Rapids
R. Branco
7° 40'
8°
8° 20'
8° 40'
9°
9° 20'
9° 40'


8°
8° 20'
8° 40'
9°
9° 20'
9° 40'
10°
10° 20'
R. Machadinho
Inferno Rapids
R. Madeirinha
Penelles Rapids
Chuvisco Rapids
R. Branco
house of the rubbermen



Map of the Rio Theodoro from the survey of the Roosevelt-Rondon expedition. Scale, 1:2,000,000. Reduced and assembled from the sectional map on the scale of 1:400,000 published in the *Geographical Journal* for February, 1915.

The survey consisted of a compass traverse by Lieuts. J. S. Lyra and Pyrineos de Souza, supplemented by latitude observations at the points indicated. The whole survey was adjusted to the known positions of the telegraph road bridge and the mouth of the river.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Meeting of the Association of American Geographers and the American Geographical Society. The second joint meeting of these societies was held in the house of the American Geographical Society on Friday and Saturday, April 9 and 10. Our house was entirely at the service of the visiting geographers and about one-half of the members of the Association were present. In scientific and social interest the occasion was most successful. The visiting geographers were the guests of the American Geographical Society at the Park Avenue Hotel, where a pleasant reunion was held on Thursday evening. On Friday and Saturday our Society served noon-day luncheons to its guests and to the members of the Physiographers' Club, who were included with our own members in the invitation to attend the sessions. Our guests were much interested in the Society's exhibition of maps illustrating the progress of the war; in two block diagrams, by Professor D. W. Johnson, of the physical features of the eastern and western war fields; and in the maps loaned by Mr. N. H. Darton showing the geology of the Grand Cañon based on Mr. Matthes's sheets, and by Dr. Baker of the U. S. Agricultural Department of eight manuscript sheets of the forthcoming Agricultural Atlas of the United States. On Friday evening the geographers were delightfully entertained at the residence of Mr. George A. Plimpton of this city, when Mr. Plimpton exhibited and commented upon many specimens of his large collections of manuscripts and books illustrating early American geography.

Vice-President John Greenough opened the Friday morning session with the following remarks:

"GENTLEMEN OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS: It is my privilege, in behalf of the American Geographical Society, to welcome you once more to our home in this city and to recall the agreeable memories of our gathering here a year ago. The interval has been marked by steady continuance in the unobtrusive activities of our Societies, both of which have escaped, I am happy to say, any serious inconvenience from the clash of opposing hosts in Europe. But the dreadful clouds of the war oppress the spirits of all observers, and we especially deplore the anxieties, suffering and loss which must have been sustained by our European brothers in scientific pursuits, many of whom were our guests and companions a little more than two years ago on the occasion of the Transcontinental Excursion of the American Geographical Society. I trust that it will not be deemed inappropriate that I should make this avowal of our earnest sympathy with each and all of them regardless of the unhappy differences which have entailed the great tragedy now occupying the continental arena.

"The universal interest felt in this community in the study of the geography of the war has been evinced by the numbers who have sought information from our maps and collections. Visitors by the tens of thousands have called upon us during the recent months and have found desired knowledge or stimulus to further inquiry. An observation of the mental attitude of many of these to whom evidently a suggestion of the pleasure and value in geographic knowledge was made manifest for the first time, lends encouragement to the conviction, which has always animated our Society, that the field of geographic inquiry as at present defined opens to the student an inviting field for intellectual enjoyment and diversified interest. The science no longer confines itself to the question 'Where,' but adds the interrogatories 'Why and How;' in other words, the sphere of the geographer is allowed to include not merely topography and physical attributes, but practically every phase of

creation upon this planet, including mankind and his development. What wider or more enticing avenue could be presented to a sympathetic intelligence? To point the way and assist proselytes in its pursuit must always be one of the chief ambitions of our Society, and, as I believe, of all you gentlemen. And in this connection I may with propriety announce that an agreement has been made with your accomplished and devoted Secretary, Professor Bowman, whereby, after July 1, he is to join the staff of the American Geographical Society, as Director and Librarian. Our Society regards this arrangement as most auspicious, for not only do we hope to benefit from his scholarship, administrative ability and acquaintance, but we trust that his accession may be the means of strengthening the ties which already unite us to your Association.

"The programme of the meeting is varied and of exceptional interest. Its character and the numerous and distinguished attendance here present assure the success of our gathering. I am sure that some of the speakers must be already straining at the leash, and I am conscious that I block the way. Therefore, with renewed greetings, I yield my place and make my submission to your newly elected and ever-distinguished President, Professor Dodge."

Professor R. E. Dodge, President of the Association, presided and the audience room was crowded at every session.

The programme included nine papers, all but one of which was illustrated. Discussion followed the reading of most of them.

The speakers and titles were:

W. M. DAVIS: The Coast of New Caledonia.
H. E. GREGORY: Geography of the Navajo Country.
MARK JEFFERSON: Utah, the Oasis at the Foot of the Wasatch.
C. S. SCOFIELD: The Geographic Factor in Agricultural Industries.
N. H. DARTON: Origin of Some Desert Basins.
M. L. FERNALD: The Natural History of Ancient Vinland and its Geographic Significance.
BAILEY WILLIS: Argentina and the Argentines.
R. DEC. WARD: Winter Weather as a Factor in the Great War.
LAWRENCE MARTIN: The Muir Glacier in 1911 and 1913.

A number of the papers will be printed in the *Bulletin* in whole or in part. The two days' sessions were regarded as surpassing even last year's fine meeting in interest and value.

Meetings of the Society. A meeting of the Society was held at the Engineering Societies' Hall, No. 29 W. 39th Street, on Tuesday evening, March 23, at 8:30 o'clock. Vice-President Greenough in the chair.

The following persons recommended by the Council were elected Fellows:

Ruth Kedzie Wood, Cherry Valley, N. Y.
Augustus Van Cortlandt, Sharon, Conn.
Charles C. Goodrich, Orange, N. J.
Horace Holden, Morristown, N. J.
C. F. Brooks, Washington, D. C.
Charles B. Slaughter, New York City.
George W. Thomson, New York City.
L. A. Cushman, New York City.
Mary Cadwalader Jones, New York City.
Angela Gallagher, New York City.
B. R. Baumgardt, New York City.

Mr. Harry Clarke Ostrander then addressed the Society on "From Cairo to Constantinople." His lecture was illustrated by moving pictures and lantern views.

On Tuesday evening, April 6, an extra inter-monthly meeting was held at the Engineering Societies' Hall, at which Mr. Herbert Lawrence Bridgman, President of the Department of Geography of the Brooklyn Institute of Arts and Sciences, addressed the Society on "Bulgaria," with lantern illustrations.

NORTH AMERICA

Earthquakes at Charleston. Mr. Stephen Taber, who has been investigating the earthquake history of the Charleston earthquake district and has published his results (*Bull. Seis. Soc. America,* Vol. 4, 1914, pp. 108-160), finds records of not more than eight shocks, only two of them strong, during the two centuries preceding the great Charleston earthquake of August 31, 1886. Many shocks have occurred, however, since that earthquake. From 1886 to 1897 there were 318 shocks and from 1898 to 1913, 77. Mr. Taber's study as to the effects of meteorological and astronomical phenomena on the frequency of these earthquakes leads him to believe that most of them are due to adjustments along a fault running from near Woodstock in a northeast to a southwesterly direction. Many of the minor shocks, however, he believes are caused by the adjustment of stresses set up by the more important movements. Changes of pressure which differently affect the rocks on the northwest and southeast sides of the fault are the chief factors influencing the frequency of earthquakes. He regards rainfall, the level of the underground water-surface, and the barometric gradient as the most important of these factors; and he thinks the changes in sea-level, variations in sun-spot frequency and the attraction of the sun and moon as of no particular consequence.

Work of the Coast and Geodetic Survey. Work will begin in June on an arc of primary triangulation which will extend northwesterly from the thirty-ninth parallel triangulation near Great Salt Lake and connect with the northern end of the California-Washington arc. This triangulation will close another large loop and will give a much-needed primary control to the mountainous regions of southern Idaho and eastern Oregon. Assistant C. V. Hodgson will be in charge of the main party and all the observing will be done by him. Motor trucks will be used instead of teams for transporting the parties in the field.

In 1912 an arc of primary triangulation was measured from the thirty-ninth parallel near Denver north to the Canada boundary approximately along the 104th meridian. It is now planned to continue this triangulation south to the Texas-California arc and thus not only divide the great southwestern loop of triangulation into two parts but also complete the measurement of another great meridian from Canada to Mexico.

Another Study of the Ohio Valley Flood. One of the best reports of the flood in the Ohio Valley (March, 1913) is issued by Indiana University.[1] The study is confined to the drainage area of the White River, which covers over 11,000 square miles in southern Indiana. The first part deals with the laws of streams and general conditions of floods; the second gives the result of observations along the White River; the third dismisses in ten pages a wide range of flood subjects; and the fourth is an excellent résumé of the text. The pages devoted to observations are the most valuable feature; such topics as damage to soil and the effects of erosion and deposition, the quantity and distribution of sand, gravel and silt deposits, bank cutting, the effect of trees on bank cutting and on deposits and the effect of grass-sod on erosion are considered; and they make the study of a limited area especially valuable. A few paragraphs, unusual in reports of large areas, augment the value of the pamphlet; one covers the relation between flood and sickness, and though the result of the inquiry was not conclusive, the investigation was worth while. That excessive rainfall was the only cause of the flood, that railroad bridges are usually too small and restrict the flow of water, and that the flood occurred at a season when a minimum amount of damage to growing crops is incurred agree with reports from other areas. In the area studied 7,850 acres were denuded, 160 acres were lost by bank cutting, 1,520 acres were badly covered with sand and gravel and 15,600 acres were covered with silt. The estimated damage

[1] H. P. Bybee and C. A. Malcott: The Flood of 1913 in the Lower White River Region of Indiana. *Indiana University Studies, 22.*

to soil alone is placed at $246,500, and the cost of replacing the structures damaged or destroyed is estimated at nearly $500,000. The report supplements in an admirable way the already published accounts of this unusual flood.

ROBERT M. BROWN.

Forest Influences upon Climate. The United States has thus far contributed little original observation to the much-discussed question of the influence of forests upon climate. A study along these lines has been made by G. A. Pearson, Forest Examiner, whose results are presented in "A Meteorological Study of Parks and Timbered Areas in the Western Yellow-Pine Forests of Arizona and New Mexico" (*Monthly Weather Review*, October, 1913). The object was to determine the influence of the forest cover upon the local climate in the Southwest in so far as this influence might be important in the management of timber lands, and the possible afforestation of parks and denuded areas. The meteorological observations were made at "parallel" stations, in the European fashion, the instruments being of standard Weather Bureau type, installed and operated under the direction of that bureau. These observations show that the influence of the forest is similar to that already indicated for Europe, except in the case of the relative humidity, for which the data are inadequate. The Arizona and New Mexico forests modify the extremes of temperature, reduce wind velocity, decrease evaporation, and do not have an appreciable influence upon precipitation except in connection with the distribution and the disposal of the snow or rain.

R. DEC. WARD.

Better Protection against Forest Fires. *American Forestry* (Vol. 21, 1915, pp. 47-50) says that of the 6,112 fires reported up to Dec. 1, 4,954, or 81 per cent., were extinguished by the protective organization before they had covered ten acres. This is the best record in the history of the service. Preliminary estimates show that the area burned over will probably not exceed 300,000 acres. The larger part of this area was on old burns and on brush and grass land. In fighting the fires the effort was to keep the fire as far as possible out of green timber. The effort was very successful, for the total damage to green timber was probably not over $450,000. This is in marked contrast to 1910, when 6,500,000,000 feet of timber were burned, valued at over $10,000,000.

The success in preventing large disasters during the past season was due to preparedness to meet emergencies. In the past four years great progress has been made in equipping the forests and in the organization of the fire force. During this time there have been added 1,368 miles of roads, 9,617 miles of trail, 12,000 miles of telephones, 300 new fully equipped lookout stations, 695 headquarters buildings, and many other improvements. The greatly improved organization of the fire force has also been a large element in reducing the amount of damage.

New Welland Ship Canal. The Welland Canal is one of the oldest and most important of the artificial waterways of Canada. It has been of great service as a channel of communication between Lakes Erie and Ontario and in the regulation of railway freight rates. It is west of the Niagara River in Ontario, and extends from Port Colborne, on Lake Erie, to Port Dalhousie, on Lake Ontario, twenty-five miles. At the time of its completion it was capable of carrying the largest vessels then doing business on the Great Lakes, but to-day few of the regular freight boats can use it, and for this reason the Canadian Government constructed at Port Colborne a grain elevator of 2,000,000 bushels capacity to transship grain from the larger to the smaller vessels. When the new canal is in operation this economic waste in transshipment will be obviated, and cargoes of grain and other heavy freight may pass from the extreme limits of the Great Lakes either way.

The new Welland Ship Canal, on which construction is now under way, will have a length of twenty-five miles. According to the *Monetary Times*, of Toronto, its width at bottom will be 200 feet and at the water line 310 feet, the depth on the sills being thirty feet. There will be seven locks, each 800

feet in length. Each will have a lift of 46½ feet, making a total lift of 325½ feet. The canal, for which all the contracts have been let, is to be finished by 1918 at a cost of $50,000,000, all of which is to be borne by the Dominion Government. At present 2,000 men are excavating the northern end of the canal. The bulk of the freight traffic to be handled on the new waterway will be grain, though there will be enormous quantities of coal and other bulk freight destined for upper Lake ports. The canal will be free to all vessels using it, and will benefit the United States as well as the Dominion of Canada.

CENTRAL AMERICA AND WEST INDIES

Climate of Porto Rico. Dr. Oliver L. Fassig, of the Maryland State Weather Service, is preparing a final report on the climate and weather of Porto Rico and hopes to complete the work this summer. He has published in the past three years a number of preliminary papers on the climate of the island. The coming report will form a comprehensive study of all the data recorded during the past fifteen years under the auspices of the U. S. Weather Bureau at about fifty stations in Porto Rico.

ASIA

Glacial Phenomena in the North Japanese Alps. Professor K. Oseki, in the *Scottish Geographical Magazine* (March, 1915, pp. 113-120), says that up to the present time evidences of glaciation in Japan have been obtained only from the occurrence of corries and morainic ridges in the northern Hida Mountains. Alpinists believe that in the South Japanese Alps (the Akaishi and Kiso Mountains) the highest peak of which, Akaishi San, has an altitude of 10,140 feet, traces of glaciers have been detected, but Professor Oseki cannot confirm this from his own observations. The traces of glaciation in the northern Hida Mountains are not very striking, but during the glacial period small hanging glaciers must have descended to a level of about 8,200 feet above the sea. Moraines with striated boulders, striated surfaces and roches moutonnées have hitherto not been identified with certainty in the corries. At the lowest point the elevation of the corrie floors is about 8,200 feet above sea level, and it is assumed that this was the altitude of the snow line during the glacial period. As the highest peak of the mountain chain (Yarigatake, 10,426 feet) does not reach the snow line of the present day, we must conclude that the depression of the snow line during the glacial period was not less than 2,300 feet.

AUSTRALASIA AND OCEANIA

A Harvard Expedition to the Fiji Islands. Prof. R. A. Daly informs us that another grant from the Sheldon Fund has enabled the Department of Geology in Harvard University to plan an expedition to the Fiji Islands. Mr. W. G. Foye, candidate for the Doctor's degree in geology this year, and Mr. W. M. Mann, of the Bussey Institution, have been appointed, respectively, as geologist and zoologist of the expedition. The primary purpose will be to secure any new data regarding the origin of coral reefs, the composition and physiography of volcanic islands, and the problems of zoogeography. A period of from nine months to one year is planned for the expedition.

EUROPE

The White Sea Route. As the Baltic and Black Seas are not available for the Russian export trade at present, there remains only one sea route, the White Sea, which was, in fact, the only commercial highway by sea between Russia and England in the sixteenth century and continued so for over 150 years. At that time, England exported to Russia manufactured goods in exchange for furs, walrus tusks and other raw materials. The *Izvestiya* of the Archangel Society for the Exploration of the Russian North (Vol. 6, 1914,

No. 18, pp. 602-605) says that, should the war be prolonged, the port of Archangel will become indispensable for exports of perishable goods and imports of surgical instruments, drugs and other supplies for the army.

Archangel as a seaport has some drawbacks, such as the interruption of navigation in winter, the length of the voyage to western Europe, the bar at the mouth of Northern Dvina, and the restricted freight capacity of the narrow-gauge railroad between Vologda and Archangel. The question of using Archangel as a port during the war has been taken up by the Russian Chamber of Commerce and the Russian-English Commission organized to facilitate commercial exchanges between Russia and England. The Commission believes that the Government should permit exports through Archangel to friendly neutral countries of such goods as may be spared without imperiling the army supplies and domestic markets. Butter, eggs and cheese should be put on the list of exports. The value of the butter exported from Siberia, before the war, was 80,000,000 roubles annually, but, under present conditions, this commodity is almost worthless. The narrow-gauge railroad from Vologda should be rebuilt without delay, and freight rates and duty on exports should be fixed at a very low figure. The Commission has advised the Government to adopt these measures.

The Sun (April 15) reports that Russia now has direct cable communication with Great Britain. From England the line extends across the North Sea, and along the coast of Norway and the northern coast of Europe to Alexandrovsk on the Murman coast. The laying of the cable was completed in eleven days and is considered a remarkable piece of work. H. DE H.

POLAR

ARCTIC

Emperor Nicholas II Land Reported to be 100 Miles Wide. A letter received by Mr. Herbert L. Bridgman from Gen. de Schokalsky, dated Petrograd, Feb. 14, 1915, says: "Our Arctic Expedition under the command of Captain B. Vilkitzsky of the Imperial Russian Navy is now at their winter camp on the west side of the Taimyr Peninsula. During this cruise they have discovered another little island south of Bennett I. and demonstrated that the Land of Emperor Nicholas II. has a width of 100 miles. The strait between it and the Chelyuskin Cape is only thirty miles wide."

Nature (March 4, 1915) says that the fact that Captain Vilkitzsky was in Taimyr Bay to the west of Cape Chelyuskin was made known by a wireless message from him that was "picked up by Captain Sverdrup, who is laid up further to the southwest on the same inhospitable coast. Captain Vilkitzsky having set out in July last from Vladivostok to make the passage to European Russia has thus accomplished about three-fifths of the voyage along the Russian Arctic coast. He proposes to send some of his men to Sverdrup, thus relieving the pressure upon his supplies, for he has encountered such heavy ice conditions hitherto that it does not seem certain that he will be able to get on with his ships next summer. The expedition has ample opportunity to add to geographical knowledge (as it has done already) on the coast where it is now imprisoned."

WORLD AND PARTS OF IT

North Atlantic Ice Patrol, 1915. *Hydrographic Bulletin* (No. 1,331) says that on Feb. 15 the U. S. Coast Guard cutter *Senator* left New York for the Grand Banks of Newfoundland to locate the ice fields and positions of the icebergs. When the ice moves southward so as to make a constant patrol necessary, an additional vessel will be detailed for that purpose. The experience of the past two years shows that a continuous ice patrol should begin about April 1 and continue throughout the season of dangerous ice conditions.

Distribution of the Jews. According to *Deutsche Rundschau für Geographie* (Vol. 37, No. 2), there are 11,871,783 Jews in the world, of whom 8,942,266 live in Europe, 1,894,409 in America, 522,635 in Asia, 341,867 in Africa and 17,106 in Oceania. Of the European Jews, 5,110,548 live in Russia, 1,224,899 in Austria, 851,378 in Hungary, 607,862 in Germany, 282,277 in European Turkey, 266,652 in Rumania, 238,275 in England, 105,968 in the Netherlands, 100,000 in France, 52,115 in Italy, and 33,663 in Bulgaria. Of all cities, New York has the largest Jewish population with 1,062,000. Warsaw comes next with 254,712 or 35.8 per cent. of its population; Budapest, 186,047 (23.5 per cent.), Vienna, 146,926 (8.8 per cent.), London, 144,300 (2.1 per cent.), Odessa, 138,935 (34.4 per cent.), Berlin, 98,893 (4.8 per cent.), Lodz, 98,671 (31.4 per cent.), Chicago with a round 80,000, Saloniki and Philadelphia, 75,000 each, Paris, 70,000, Constantinople, 65,000, Vilna, 63,841 (41.3 per cent.) and Amsterdam, 59,065 (11.5 per cent.)

METEOROLOGY AND CLIMATOLOGY

Temperatures, Sunspots and Volcanic Eruptions. Köppen, more than forty years ago, began a study of a possible relation between the eleven-year sunspot period and terrestrial weather conditions. He has recently summarized his later investigations (*Meteorol. Zeitschr.*, Vol. 31, 1914, pp. 305-328), and finds that the eleven-year oscillation in temperature now seems smaller, but much more regular, than he determined it to be in 1873. In all of the latest sunspot periods, for which the temperatures are known for about one-sixth of the earth's surface, the mean temperature at the time of sunspot minimum, or soon after, was about 0.5° C. higher than in the years following the sunspot maximum. When smaller portions of the earth's surface are considered, this regularity is masked; the eleven-year periodicity in temperature appears to be more marked in some periods, and to disappear in others. The districts with positive temperature departures are larger and more intense at times of sunspot minima; those with negative departures are larger and more intense at times of sunspot maxima. It seems to be "chance," and almost independent of the sunspot period, what places fall into one or the other area. The eleven-year cycle, Köppen says, is the first definitely established period in weather phenomena. The source of this temperature-periodicity is thought by Humphreys to lie in a decrease of radiation at the time of sunspot minima in consequence of the formation of ozone in the higher atmosphere. The question of the effect of volcanic dust upon the receipt and loss of radiation also enters into the problem, and a relation between air temperatures and volcanic eruptions has recently been shown to exist by Abbot and Fowle, and by Humphreys. It is obvious that the problem is by no means solved, as yet, and offers an interesting subject for further investigation. R. DEC. WARD.

Popular Weather Fallacies. In the *Popular Science Monthly* for February, Andrew H. Palmer, of the U. S. Weather Bureau, has considered some "Popular Misconceptions concerning the Weather." A score or more of the most widespread notions are briefly discussed. The confusion of truth and falsehood is pointed out. And what is known regarding actual meteorological facts is set over against the popular, traditional, belief.

From early years all of us make some sort of crude weather observations, and begin to accumulate a store of weather proverbs and weather lore. This, because handed down from generation to generation, seems to have stood the test of years, and is therefore generally accepted as authoritative. Few sciences are hedged in with more popular misconceptions than is meteorology. There is need, at frequent intervals, and in all countries, of simple and direct presentation of some of the fallacies in the prevailing popular notions regarding weather controls and weather prognostics. R. DEC. WARD.

EDUCATIONAL GEOGRAPHY

Geography in the Summer Schools

The institutions mentioned below will send their Summer School announcements to those interested

Colorado. The University of Colorado, Boulder, Col., will have its first summer school (June 28–August 6) of geology and geography. Miss Ellen Churchill Semple has been secured for two courses of lectures, one on the general principles of anthropogeography and the other on the geography of the Mediterranean Basin in relation to its history. The lecture courses of six weeks will be followed by field study of life under semi-arid conditions in southwestern Colorado. Prof. William B. Scott, Princeton University, will have courses in historical geology and stratigraphy. Associate Prof. Walter E. McCourt, Washington University, will have courses in principles of earth science, field geology, economic geography, and a teachers' course in geography. A geological excursion through Colorado (Aug. 7–Aug. 28) will be conducted by Associate Prof. McCourt.

Illinois. University of Chicago. The summer session will begin on June 21. The geographical courses are: Teachers' course in geography, an introductory study for teachers in secondary and primary schools, Miss Lanier; Physiography, the earth's features, agencies affecting them, etc., with elements of meteorology and oceanography, Prof. Salisbury and Assistant Prof. Bretz; Economic and commercial geography, Dr. Jones and Miss Lanier; Elements of meteorology, general principles of meteorology, elements and controls of weather, etc., Mr. Reed (University of California); Climate of North America, with special reference to the United States, Mr. Reed; Geography of Europe, Associate Prof. Goode; Influence of geography on American history, for teachers of geography and history, Prof. Barrows and Miss Lanier; Economic geography of the United States, the physiographic regions, climates, natural vegetation, agriculture, etc., Associate Prof. Goode; Conservation of natural resources as factors in national development, etc., Prof. Barrows; Geographic geology (advanced physiography), Prof. Salisbury and Assistant Prof. Bretz; Geographic influences in the history of the Western States, geographic conditions which have influenced the economic, social, and political history of the area, the effect on national development, etc., Prof. Barrows; Research course, advanced work on selected topics for students prepared for semi-independent work, Profs. Salisbury and Barrows and Associate Prof. Goode. Four courses are offered in field geography: (1) The environs of Chicago (primarily a study in human geography, based on field trips), five weeks commencing July 22, Dr. Jones; (2) in southwestern Wisconsin near the Mississippi Valley (an introduction to methods of regional geographic work), four weeks commencing June 21, Dr. Jones; (3) in the vicinity of Devil's Lake, Wis. (includes training in stratigraphic, surficial, and field determinations, mapping, sketching, and technical description), three classes beginning June 21, July 22, and September 3, respectively, Prof. Trowbridge, Mr. Bevan, and Asst. Prof. Bretz; (4) a course in the West for advanced students, for the most part along the Union Pacific and Southern Pacific railroads, leaving Chicago Sept. 3 and returning Oct. 2, Associate Prof. Goode.

Indiana. State Normal School, Terre Haute. In the first term of the summer school (May 24-Aug. 13) these courses are offered: elements of geography: physiographic processes, features of the earth and their relation to life, C. O. McFarland; regional geography: major natural regions of the earth, Mr. McFarland; economic and commercial geography, W. A. McBeth; North America: regional and historical geography, Mr. McFarland; geographic influences in American history, B. H. Schockel; history of the earth and its inhabitants, Mr. McFarland; the second summer term (June 21-Sept. 10) will include the above features, excepting North America, for which the regional geography of Asia, by Mr. Schockel, is substituted.

Louisiana. LOUISIANA STATE UNIVERSITY. Dr. F. V. Emerson, Professor of Geology in the University, will conduct a field course in geology in the Asheville, N. C., region. The journey to the field will be taken by daylight and class observation from trains will be required. The party will stop at Birmingham, Ala., to study the coal and iron mines and at Chattanooga, Tenn., to observe the formations and physiography of that region. The field in North Carolina includes the folded rocks of the Ridge Belt and the igneous rocks of the Asheville Basin.

Maryland. JOHNS HOPKINS UNIVERSITY. In the summer school a short course will be given on "The Teaching of Geography in the Elementary School," by Supt. Leonora E. Taft, of Woodstock, Vermont.

Massachusetts. HARVARD UNIVERSITY. A field course in physiography and general geology will be offered by Harvard University. The party will be under the direction of Prof. Wallace W. Atwood, and will be limited to those who have had at least an introductory college course in physiography or general geology. Early in August the members of the party will meet at Ouray, Colorado. They will go at once into camp, and begin the systematic study of a portion of the San Juan Mountains. For three weeks this work will continue, and the men will be trained in the official methods of field work approved by the U. S. Geological Survey. An expedition will later be conducted through the higher mountains, and possibly over a portion of the neighboring plateau.

Michigan. STATE NORMAL SCHOOL, Ypsilanti. 1. Teachers' geography, Prof. Jefferson and Miss Cawood. 2. Commercial geography, Prof. Jefferson. 3. Geographic lecture plans, Miss Cawood. 4. An elementary course in geography, Miss Cawood.

CENTRAL STATE NORMAL SCHOOL, Mt. Pleasant. A course in regional commercial geography will be given.

Minnesota. STATE NORMAL SCHOOL, Duluth. Two geographical courses, in charge of Mr. Eugene Van Cleef, will be offered at the summer school beginning on June 15 and continuing for seven weeks: (a) geography of North America; (b) geography of foreign countries. Ten local field trips including a variety of geographic topics have been arranged.

STATE NORMAL SCHOOL, Mankato. These courses in geography will be given: 1. Elementary Geography, for students preparing to take examinations for state teacher's certificates, Miss Nellie L. Woodbury; 2. Elementary Physical Geography, designed for the same purpose as Course 1, Mr. Merton P. Fobes; 3. Teachers' Course in Geography, a study of the principles of geography and their relationship to life, with emphasis on the human response to geographic environment, Mr. G. J. Miller; 4. North America, a regional study making application of the principles developed in Course 3, Mr. Miller; 5. Advanced Regional Geography, a semi-research course for those who wish to prepare as special teachers of geography. Some special line of work will be pursued by each student under the direction of the instructor. Prerequisite: Courses 3 and 4.

New York. COLUMBIA UNIVERSITY. Physical geography and its economic aspects, with lectures, laboratory and field excursions, in charge of Prof. McFarlane and an assistant. The physiographic excursion in the western United States in charge of Prof. D. W. Johnson and an assistant was noticed in the *Bulletin* (April, p. 283).

TEACHERS COLLEGE. Prof. Dodge will give a course on human geography in elementary schools, the purpose being to show how the modern viewpoint in geography will be brought into school work and school geography enriched and vitalized through emphasis of human geography. Miss Kirchwey will have charge of courses in the teaching of geography in the lower and upper grades, the teaching of regional geography in the junior high school, and gen-

eral geography for elementary schools with lectures, required readings and discussions.

CORNELL UNIVERSITY. Cornell will have a summer session of six weeks beginning July 5. The faculty will include Prof. Frank Carney of Denison University, Ohio, Assistant Prof. O. D. von Engeln of Cornell, Mr. E. D. Elston, Mr. J. S. Hook, and Mrs. G. E. Monnett. The course includes elementary physical geography, geography of North America, industrial geography, materials of geography, elements of geology, elementary mineralogy and lithology, lecture courses, and laboratory and field instruction in physical geography, elementary geology, mineralogy and lithology. Lecture and laboratory courses will also be offered in meteorology and illustrated lectures will be given by different members of the department.

North Dakota. THE UNIVERSITY OF NORTH DAKOTA, Grand Forks. Summer courses are to be given in July and August at the biological station at Devils Lake, where there are exceptional opportunities for field work in physiography and geology, especially in the study of glacial deposits and of the life history of lakes as recorded in their cliffs, beaches, and other shore features. Two courses are offered, one an elementary course in college physiography, with emphasis on practical field work and methods of teaching, and the other a first course in field geology and physiography for more advanced students. Both courses are in charge of Assistant Prof. Howard E. Simpson.

Ohio. DENISON UNIVERSITY. Miss Bertha Henderson, Chicago, will conduct courses in geography for grammar grades and on North America and geography for primary grades.

OBERLIN COLLEGE. Professor G. D. Hubbard will continue with students the work of topographic surveying, giving them practical experience among the mountains with plane table, transit and level, in the method of making topographic maps. Their camp will be pitched well up in the Appalachians of southwestern Virginia. Similar work was done under his direction in adjacent areas in previous summers.

Washington. UNIVERSITY OF WASHINGTON, Seattle. Prof. W. M. Gregory of the Cleveland Normal School will give two courses in geography in the summer school.

Wisconsin. UNIVERSITY OF WISCONSIN, Madison. The geographical and allied courses in the summer school include: (a) elementary geology, (b) applied geology, by Prof. Steidtmann; (a) commercial and industrial geography, (b) physical and applied geography, by Prof. Whitbeck; (a) geography of Europe, (b) influence of geography on American history, by Prof. Williams; advanced geography (research), by Prof. Whitbeck; field course in physiography and geology (Aug. 2-28), by Prof. Williams. The field course will cover four weeks after the summer session. Students who take this will give all their time to a study of the Baraboo District northwest of Madison.

PERSONAL

Prof. Wallace W. Atwood of Harvard University will continue, this summer, his systematic survey of the San Juan Mountains of southwestern Colorado under the auspices of the U. S. Geological Survey.

Mr. William Churchill, a corresponding member of our Society and Associate Editor of the *Bulletin*, has been appointed Research Associate in Primitive Philology of the Carnegie Institution of Washington.

Prof. W. M. Davis will be engaged this summer in writing the report on his Shaler Memorial study of coral reefs.

Prof. George D. Hubbard of Oberlin College, after August 5, will renew his service for the Ohio Geologic Survey partly in the field, but most of his time will be given to writing a report on the physiography of Ohio.

Prof. D. W. Johnson of Columbia University lectured on the "Physiography of Western Europe as a Factor in the War" at the Rochester Academy of Science on March 29; at the Case School of Applied Science, Cleveland, on March 30; at Denison University, Granville, on March 31; at the annual meeting of the High School teachers of Michigan, Ann Arbor, on April 1; and at Johns Hopkins University on April 8. On April 7 he lectured on the "Physical History of the Grand Cañon District" before the Natural History Society of Harrisburg, Pa.

Mr. George J. Miller of the State Normal College, Mankato, Minn., is planning to spend August in studying the geographic conditions along the Grand Trunk Pacific route from Winnipeg to Prince Rupert.

Mr. Leonard O. Packard of the Boston Normal School, in cooperation with the Department of Efficiency of the Boston Public Schools, has been conducting geography tests in the elementary and high schools of Boston. One purpose is to learn the possibilities of estimating, by means of tests, the efficiency of geography teaching in the schools. He will spend a part of the summer in studying the data thus obtained.

As Sheldon Fellow, sent out by the Department of Geology at Harvard, Dr. Sidney Powers is now engaged in a six months' study of geological and geographical problems in Hawaii.

Mr. Howard E. Simpson, Asst. Prof. of Geology at the University of North Dakota, will, this summer, make a physiographic survey of the islands of Devils Lake, the State Bird Reserve, and if time permits a similar survey of the islands in Stump Lake, the National Bird Reserve. His department hopes to complete, this summer, its study and mapping of the shore lines of Lake Minnewaukon and Devils Lake.

Mr. Philip S. Smith, early this year, was transferred from the Division of Alaskan Mineral Resources of the U. S. Geological Survey to the position of Administrative Geologist. This work will require his being in Washington practically the entire year, as in the absence of the Director he will serve as acting Director.

Mr. Walter S. Tower of the University of Chicago will spend the summer on our Pacific coast and in the northwestern section of Canada. He hopes in Canada to visit the new regions recently opened by railroad extensions, with a view of determining the influences of geography on the various aspects of their development.

Mr. Eugene Van Cleef of the State Normal School, Duluth, Minn., will continue the study of climate in relation to the muskeg (peaty) soil of northeastern Minnesota. The local climate will also be studied with reference to the establishment of a hospital there for sufferers from tuberculosis of the bone. Insolation and solar intensity are two fundamental problems involved.

Prof. R. DeC. Ward of Harvard University, will spend the summer vacation in New Hampshire, working on his "Climatology of the United States."

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Life in America One Hundred Years Ago. By Gaillard Hunt. xi and 298 pp. Ills., index. Harper & Bros., New York, 1914. $1.50. 8½ x 5½.

This book was written at the request of the Committee of One Hundred to celebrate a century of peace between Great Britain and the United States. Life in America a hundred years ago is depicted in all its phases. And the changes which have taken place between those days of the country's youth and the present time are indeed striking.

For instance, during the period described, the densest population was in Massachusetts, where the average was sixty-five persons to a square mile. Illinois, Indiana, Michigan, Missouri, and the far West had more square miles than there were people. New York, with a population of 96,373, was the largest city. Only 6 per cent. of the population lived in cities of over 5,000 inhabitants; most of the people were farmers.

There was more travel between New York and Philadelphia than between any other two points. Four stage coaches started daily, except Sunday, from either city bound for the other. The "Mail Stage," carrying only six passengers, made the trip in 17 hours. The fare was $10. To send a letter not more than 30 miles cost 8 cents; over 400 miles, 25 cents.

Concerning social conditions, there were 1,200,000 slaves; and with regard to the white workingman, the author says that "universal manhood suffrage did not exist and very few laborers could vote, so there was no legislation in the interest of labor." The working-day was from twelve to fifteen hours long. Men's wages in the factories were from 65 to 75 cents a day. "There was no legal restriction on the employment of women and children, and they constituted a majority of the employees in the factories." In some instances the women and children were whipped by their employers to urge them to do more work.

The only technical school was the Military Academy at West Point; there were no high schools, and no coeducational academies.

So different were the newspapers from those of to-day that "one might read his newspaper for a month and not read of a crime." But there was crime, and the great cause of it was strong drink. Dueling was popular among the upper classes, especially in the South. Failure to pay a debt could be punished by imprisonment. The book is illustrated, has a good bibliography, and contains a wealth of interesting information.

WILBUR GREELEY BURROUGHS.

Clouds of California. By Ford A. Carpenter. 18 pp. Ills. U. S. Weather Bureau, Los Angeles, Cal., 1914. 7½ x 5½.

Dr. Carpenter's little volume has a charm of presentation and of appearance which is entirely in keeping with the subject. The illustrations, from original photographs, are excellent. The discussion is pointed and clear. To the well-known international classification of clouds Dr. Carpenter adds the local form, *el velo*—the common cloud of early morning and late evening from May to September, along the Pacific coast from the Straits of Fuca to Lower California. The author is quite right when he says: "There is, perhaps, no single phase of meteorological observations that will bring such ample returns for the time spent as a study of clouds."

R. DEC. WARD.

The Weather and Climate of Chicago. By H. J. Cox and J. H. Armington. 375 pp. Maps, ills., index. *Geogr. Soc. of Chicago Bull. No. 4.* Chicago, 1914. 10 x 7.

Not since the publication of Professor Oliver L. Fassig's report upon the climate and weather of Baltimore (1907) has there been so notable a contribution to local American climatology as is this one. Professor Fassig's monograph was a pioneer work, which well deserved the hearty reception accorded to it, both here and abroad. The authors of the present volume have obviously modeled their own discussion along the lines laid down in Professor Fassig's earlier work, and they acknowledge their indebtedness to him. These lines, it may be noted, are those whose clear definition and standardization we owe to the world's master of meteorological science, von Hann.

Tables, diagrams and maps are given in abundance, as well as brief and clear summaries in the text. There were difficulties in regard to the homogeneity of the meteorological data, resulting from changes in the exposures of the instruments, and these changes impair the value of certain results. This fact the authors recognize, and they have made interesting comparisons of temperature and rainfall under different conditions of exposure. It should, however, be borne in mind that differences which appear in the values of any meteorological elements, when compared for different years and exposures, may result from differences in the general meteorological conditions in these groups of years, and not necessarily from the exposures.

The book contains a fairly complete statement regarding storm tracks and weather types, a subject which we should have liked to see at the beginning of the book rather than at the end, and which might well have been a good deal more complete. There are several useful and striking figures, notably those illustrating types of temperature curves and those showing the effects of wind direction and of state of sky upon temperature. American climatology is the richer because of Cox and Armington's excellent volume.

R. DEC. WARD.

With Poor Immigrants to America. By Stephen Graham. xviii and 306 pp. Ills. The Macmillan Co., New York, 1914. $2. 8 x 6.

The latest of Mr. Graham's fascinating books. His remarkable insight into the nature of peoples and countries and his rare gift of literary expression are the two elements that usually make his pen pictures true to life and full of entertainment. As is his custom, he traveled with the lowly. The steerage was his home at sea, the immigrants were his friends, and many fine qualities shone in the strangely mixed company of prospective Americans. The running of the gauntlet at Ellis Island is described in his happiest vein. He "footed it" from New York to Chicago through the Pennsylvania coal regions, fraternized with tramps, studied the American farmer, fell in love with suburban development and with our city parks, but deplored the unlovely state of New York and Chicago. He writes of the United States and its progress with mixed feelings. Our country is a land of wonderful enterprise and of vast opportunities, but we live too much in the material, too little in the soulful. He sees much to admire in America, but he loves Russia. Here are his concluding paragraphs:

"America is too happy and certain and prosperous a place for some. It is a place where the soul falls into a happy sleep. The more America improves, the more will it prove a place of success, of material well-being, of physical health, and sound, eugenically established men and women. But to me, personally, success is a reproach; and failure, danger, calamity, incertitude is a glory. For this world is not a satisfying home, and there are those who confess themselves strangers and pilgrims upon the earth."

"Back to Russia! From the most forward country to the most backward country in the world; from the place where 'time is money' to where the trains run at eighteen miles an hour; from the land of Edison to the land of Tolstoy; from the religion of philanthropy to the religion of suffering—home once more."

Aus und über Amerika. Studien über die Kultur in den Vereinigten Staaten von Nordamerika. Von Dr. Adolf Rambeau. 1. Serie. viii and 351 pp. N. G. Elwert, Marburg, 1912. Mk. 6. 9½ x 6.

These are brilliant notes, very witty, sometimes sarcastic, frequently cutting because they are true. It is well to have this chance to see what impression our culture has produced upon a German of education who held for a dozen years educational positions in our university life. The sum of these observations is not a true picture of our American society. Yet we cannot deny that there is authority for each one of the incriminating details which crowd his picture. The point which escapes him is that we are under the constant struggle to assimilate great meals of new material to nourish the American body. He came into contact with faculties and students; each element of his scholastic environment was awkwardly trying to assimilate him and he could see no more than the gluttony and the bad table manners. These studies will most distinctly appeal to those who are most held up for castigation, for it is positively one of the most interesting of all attempts to criticise our national thought life. As one committed to the university tradition, it is too much to expect that he could comprehend the existence of our great study foundations wihout faculties. He calls them "kapitalistich-wissenschaftliche Gründungsliebe oder Gründungsmanie"; but he might in a dozen years have learned that the Carnegie Institute is in Pittsburgh and that the research foundation in Washington is the Carnegie Institution. WILLIAM CHURCHILL.

An Historical Journal of the Campaigns in North America for 1757-1760. By Capt. John Knox. Edited, with introduction, appendix and index by Arthur G. Doughty. Vol. 1: 512 pp. Maps, ills. Champlain Society, Toronto, 1914. 9½ x 7.

Capt. John Knox was an officer of the British army in North America during the struggle between England and France for the possession of that continent. His *Journal* was first issued in book form nearly a century and a half ago. The work had never been reprinted, and consequently had become rare.

Not only did the author set forth an account of the military and other immediate happenings of the day, but he also gave a description of the country, its climate, soils, etc. He included many military General Orders, which often are of great historical value. Written on the spot, and at the very moment that the events described were taking place, the *Journal* gives us a vivid picture of the life of those stirring days. The editor has supplemented the statements of Knox by citations from contemporary authorities. There are numerous maps and illustrations. WILBUR GREELEY BURROUGHS.

Die erste Entdeckung Amerikas im Jahre 1000 n. Chr. Von Gustav Neckel. (Voigtländers Quellenbücher). 92 pp. Ills. R. Voigtländer, Leipzig, 1914. 80 pfg. 7 x 5.

We have here in the primer form a concise discussion of the present state of our knowledge as to the transatlantic voyages of the Scandinavian adventurers and an examination of the varied interpretations which have been placed upon these fragmentary records. Within such narrow compass it has been, of course, quite impracticable to enter upon details of the several debatable points, but the conclusions reached by masters of this particular branch of study are clearly presented. The author epitomizes the results of the recent studies of Nansen in his work published in English as "In Northern Mists." WILLIAM CHURCHILL.

A History of Canada, 1763-1812. By Sir C. P. Lucas. 360 pp. Maps, index. Oxford University Press (Amer. Branch), New York, 1909. 9 x 6.

A history of Canada during 1763-1812 must be largely taken up with the Revolutionary War and the causes which led to the War of 1812. As the writer had already treated this latter question in a previous volume it receives only a passing mention here. An English view of the American Revolution is

always of interest to us. The author says that, until late years, Englishmen were taught that England's defeat was a victory of right over might, of liberty over oppression, and that England sinned grievously and was grievously punished. The writer properly ascribes England's discomfiture to her second-rate statesmen and military leaders and the fatuous policy which they pursued. Throughout his account of the struggle the author holds an unconscious brief for his own country. At this day it certainly ought to be possible for a historian to decide definitely whether Tarleton refused quarter to the captured. It should not be necessary to leave the matter as an unproved charge.

DAVID H. BUEL.

La France vivante en Amérique du Nord. Par Gabriel Hanotaux. 264 pp. Hachette et Cie, Paris, 1913. Fr. 3.50. 7½ x 5.

The motive which led to the writing of this volume was the celebration by France and the United States of the discoveries of Samuel Champlain. M. Hanotaux presents Champlain in his proper place in the discovery history of America and in the social movement of France which sent him and other adventurers forth into the wilds. He reviews the past of French America and discusses the present of French Canada and its relation to the evolution of the preponderant British society on either side of the St. Lawrence. The work is well conceived as a memoir upon an interesting theme in our history, and the story is happily set forth with all the graces of style of which Mr. Hanotaux is a master.

WILLIAM CHURCHILL.

A Short History of the Canadian People. By George Bryce. Revised edit. xiii and 621 pp. Map, ills., index. Charles Scribner's Sons, New York, 1914. 9 x 6.

This is a revised and amplified edition of a volume well known to students of Canadian history, which, for some time, has been out of print. The author has covered the whole field, from the days of Jacques Cartier to the present time. The edition before us contains considerably less of earlier history than did the former; while the last twenty-five years, by far the most interesting and important part of Canadian history, have had due consideration in 122 pages of new material. The value of the book is increased by the inclusion in the appendix of several unique features, such as the text of the British North America Act; a list, with dates, of the successive governors-general of the Dominion and of the governors of the several provinces, from earliest times to the present; a table of leading events in Canadian history, with date of each event; a large political map of Canada in colors, and an extensive list of authorities and references.

The revised volume should appeal to the general reader, and it is suitable for classroom work in colleges and normal schools. The author is a prominent Canadian educator, author and man of affairs.

AVARD L. BISHOP.

Among the Canadian Alps. By Lawrence J. Burpee. 239 pp. Maps, ills. John Lane Co., New York, 1914. $3. 9 x 6½.

An account by a writer appreciative of the marvels of the Canadian Rockies. The book takes one among the Canadian National Parks, along trails and canyons, up mighty mountain slopes, into secluded caves and far from the ordinary pathways of travel and gives an alluring picture of this wonderful region. It is apparently written for the visitor to the Northwest rather than for the distant reader, as specific directions are given concerning routes of approach, and in every instance the narrative tells the story of the travels and adventures of earlier explorers as an historical background. The pictures, even more than the text, furnish a key to the lure of these mountains, and as they are reproduced with care they form a notable part of the book. A bibliography of exploration in the Canadian Rockies ends the volume. Six maps, of no value whatever and which ought not to have passed the censor, have been inserted.

ROBERT M. BROWN.

Quebec: The Laurentian Province. By B. Willson. xii and 271 pp. Map, ills., index. F. A. Stokes Co., New York, [1913]. $3. 9 x 6.

The appeal of this work lies mainly in the glimpses it affords of a nation in the making.

No effort, however, is made to delve into the origin of the developments or traits recorded. The presentation of a few facts of fundamental importance would have enhanced interest without detracting from the pleasant style of the text. For instance, the charm of settlement appears at its best in the riparian villages along the St. Lawrence. The width of this zone of habitation coincides with the extension of the Lower Silurian limestone area, in which rock constituents, carrying elements of fertility, have enabled quaint hamlets and pleasant meadows to stud and clothe a portion of the river valley. Much of the beauty of the landscape in this part of Canada is due to this calcareous foundation. The mention of such strictly scientific relations between man and mother-earth is so satisfying to readers that authors can hardly afford to overlook them.

LEON DOMINIAN.

SOUTH AMERICA

Grundzüge der Pflanzenverbreitung in Chile. Von Karl Reiche. 374 pp. Maps, ills., index. **Die Pflanzenwelt der peruanischen Anden in ihren Grundzügen dargestellt.** Von A. Weberbauer. 355 pp. Maps, ills., index. Nos. 8 and 12 in series: die Vegetation der Erde. Herausgegeben von A. Engler & O. Drude. W. Englemann, Leipzig, 1911. 10 x 7.

Several years have elapsed since the publication of Dr. Reiche's work on the distribution of plants in Chile, which forms the eighth volume of "Die Vegetation der Erde." Chile extends through thirty-eight degrees of latitude and 18,000 feet of altitude, embracing some striking and diversified vegetations and flora of interesting relationships and history. Dr. Reiche has known Chile during a residence of sixteen years, and has presented an enormous accumulation of facts and observations regarding its vegetation, as well as a laborious analysis of its flora and floristic relationships. In the latter features the book is full and well executed, but in the description and delimitation of the vegetations of Chile it leaves much to be desired. The author has seen the details of his great task at too close range to be able to marshal them into the order that would bring to view its largest features. The splendid and very numerous illustrations partake of the same defect, mostly showing individual species of plants rather than vegetation.

The opening chapters recite the history of botanical exploration in Chile, list the publications on its flora and vegetation, and describe, all too briefly, the topographic and climatic features of the republic. The principal plant families of Chile are discussed with respect to their contributions to the vegetation; the vegetation types in the native flora are catalogued and examples given of each of them, and the plant formations are also listed and briefly characterized.

These chapters view the vegetation at several angles, and are useful for purposes of reference. The description of Chilean vegetation occupies only 110 of the 374 pages of the book, and should have been longer at the expense of some of the other sections. A primary subdivision is made into a northern region (18° to 31° S.), a central region (31° to 37°), and a southern region (37° to 56°), and within these regions subdivisions are made both latitudinally and altitudinally. The northern region comprises the Atacama and other desert areas, portions of which are devoid of vegetation, while other portions are sparsely inhabited by composites and salt bushes. The central region is largely occupied by a low and open shrub formation, giving way toward the south to the beech forests, which extend to Tierra del Fuego and form one of the most extensive temperate rain-forests of the globe. A few pages are devoted to the delimitation of the floral regions of Chile, with short lists of their characteristic species. These pages give a clearer delimitation of the floral regions than is given for the vegetational regions in the preceding section, in which a lack of adequate subdivision makes it difficult for the reader to secure an orderly picture of the vegetation.

The exposition of the relationships of the flora of Chile to the flora of Argentina, California, and New Zealand and a brief discussion of the geological history of the Chilean flora are the culminating features of a book which is of value chiefly as a contribution to floristic plant geography.

In the twelfth volume Weberbauer has described the vegetation of representative areas of Peru, with particular attention to the elevated regions of the interior. He has been one of the most active of recent botanical explorers in the central Andes, and his earlier papers, together with the treatise under review, have furnished the first full and well-ordered treatment of Peruvian vegetation. The volume comprises the historical, orographic, and climatological sections and the bibliography common to this entire series; but the bulk of the work is devoted to a delineation of the vegetistic and floristic features of the widely diversified equatorial Cordilleran region.

Peru is topographically more complex than Chile, and therefore presents a less simple arrangement of vegetation, with less differentiation due to latitude, but even greater altitudinal dissimilarity than is found in the Chilean Andes. The principal distributional features of Peru are the occurrence of the alpine or Puna region along the Andine highlands, of desert along the Pacific coast, and of tropical rain-forest in the far interior. Between these very dissimilar vegetations lie transitional regions of heath, ''grass steppe,'' and ''bush steppe,'' the distribution of which is interdigitated by the mountainous topography. The Puna lies above 11,000 to 12,000 feet and is characterized by a low cover of grasses, rosette and polster plants. It merges into extensive areas of grassland on the west side of the Cordillera, while elsewhere, on both the east and west slopes, it is touched by the so-called ''steppe,'' which is an open formation comprising a few trees and many shrubs, bromeliads, and cacti. The western slopes and intermontane areas of the Andes are more desert than the eastern slopes at all of the lower elevations. The ''steppes'' of the eastern slopes are rich in trees and shrubs, and just below them lies the montane rain-forest region (la Ceja de la Montaña), in which there is a mingling of tropical and temperate genera of plants and a magnificent development of a very hygrophilous type of forest. Below the narrow zone of the Ceja lies the Montaña, or tropical lowland rain-forest region, which extends, with few gaps, to the eastern frontier of Peru.

The work of Weberbauer is thoroughly executed, combining the floristic and vegetistic viewpoints; and the delineation of the plant regions is geographically clear and orderly. While those volumes of ''Die Vegetation der Erde'' which treat of the less frequented countries of the earth are, of necessity, less thoroughly and accurately elaborated than the volumes dealing with European areas, nevertheless the volumes of the former group are the more useful, both to botanical and to geographical students. FORREST SHREVE.

AFRICA

Deutsch-Ostafrika und seine Nachbargebiete. Ein Handbuch für Reisende. Von Dr. Karstedt. xi and 319 pp. Maps, index. D. Reimer (E. Vohsen), Berlin, 1914. Mk. 6. 6½ x 4½.

One of the superior German guide-books with maps that really illumine and copious information on all phases of German East Africa along the travel routes. The book is a compendium of well-classified and correct information of much value to geographical writers or students at this early stage of the study of this region.

Die Zukunft Afrikas. Von T. Kassner. Ratschläge für die Kolonisation. 60 pp. E. Stephan, Leipzig, 1912. 50 pfg. 7½ x 5.

Mr. Kassner has lived twenty years in Africa and has traveled there extensively. He deals concisely with the former and present conditions of the continent, the growth of communications, natural products of all kinds, the negro question, possibilities of white immigration, etc. He is a thoughtful writer, his book contains both information and deduction and, in general, he is sanguine that Africa will become a very important factor in the world's activities.

Africa in Transformation. By Norman MacLean. xx and 263 pp. Map, ills. J. Nisbet & Co., London, 1914. 5s. 8½ x 5½.

This a worthy book, given chiefly to the missionary phase of "Africa in Transformation," and confining most of that to the Lower Zambesi, Nyasaland, British East Africa, Uganda and Zanzibar. Throughout Tropical Africa the missionaries, by their industrial training, educational work and medical service, are playing a most important part in bettering the temporal condition of the black man and making him more useful to himself and to Africa. This fact is most interestingly set forth by the author. The subject of one striking narrative is the Blantyre Church in Nyasaland, famous as among the finest buildings yet erected by native labor in equatorial Africa. The black artisans who built it were not Christians; they knew little or nothing about the purposes to which the building was to be devoted, but they had developed skill to erect it through the patient training of a man of genius, Dr. Clement Scott; and the church is the enduring monument of this man, who died in Africa.

The book is a tribute to the value of African missions. It is full of the most convincing testimony to their worth. R. L. Stevenson spoke truly when he wrote the words quoted on the title-page: "Those who deblaterate against missions have only one thing to do—to go and see them on the spot."

Islamic Africa. By R. Burton Sheppard. 127 pp. Ills., index. The Methodist Book Concern, New York, 1914. 75 cents. 7½ x 5.

The European nations in Africa must take account of the large Moslem population of the continent. The struggle under the surface of colonization, which at times threatens to break out into an uprising, cannot be understood without some such view of the Mohammedans as is given in this book. The discussion is free from prejudice, even though the defeat of Islam is the hope of the writer. It presents a brief review of the entrance of Mohammedanism into the family of religions, the causes of its rapid advance, its goal, and its effects upon the African. The chapter on "The African as a Moslem" is especially well done, and the author presents both the advantages and disadvantages of the religion to the African from the standpoint of his future development. The book may be read easily at a sitting, and it offers a comprehensive background for the appreciation of one of Africa's vital problems.

ROBERT M. BROWN.

Richesses minérales de Madagascar. Par M. D. Levat. 359 pp. Map, ills., index. H. Dunod et E. Pinat, Paris, 1912. Fr. 15. 10 x 6½.

From the hands of one of the world's foremost authorities on auriferous deposits we have in this volume a clear and succinct account of the economic mineralogy of Madagascar. A complete record of the mineralogy of an island which exceeds France in area could not be expected here, but Levat has established the several geological horizons which make their appearance within the area of Madagascar. Having once oriented himself upon the basic geology of the island, the work of examining mineral outcrop was vastly simplified. The principal metal is gold, both in placers and in veins, an industry which has increased from an output of less than $25,000 in 1896, when France entered, to more than $2,000,000 in 1908, a figure that has since been practically maintained. In the west and northwest Levat examined two somewhat extensive fields which had been reported as having bituminous possibilities. His research proved the existence of petroleum in sufficient quantity to pay for exploitation and sufficiently rich in all the commercial oils, both light and heavy. The result of this discovery was to open these fields to commerce and establish a base of supply for the national marine. He also established the existence of deposits of uranium of a high percentage of radioactivity.

WILLIAM CHURCHILL.

AUSTRALASIA AND OCEANIA

The Opportunity in Australia. By H. S. Gullett. With an introduction by Lord Chelmsford. xviii and 148 pp. Ills. Field & Queen, London, 1914. 3s. 6d. 9 x 5½.

Upward of a million square miles of farming soils, with over twenty inches

of rainfall in excess of twenty inches, await further development. Two hundred million acres are suitable for wheat, and yet to-day only 8,000,000 acres are in wheat. Similar conditions exist in dairying, fruit, etc. Beyond this zone of precipitation sufficient for agriculture are almost boundless possibilities with the aid of irrigation. As for markets, the author says that Australian farmers are assured of an entry to the Old World's markets, and that the Far East also appears to promise an enormous outlet.

As a guide to this land of opportunity the book is excellent. Among the topics are transportation rates from England to Australia; lands available for settlement and directions for securing them; advice to immigrants with money and to those without capital; irrigation; wheat, dairy, fruit farming, grazing; and labor-saving machinery. An account is also given of the Northern Territory (about 500,000 square miles), now being opened up. Papua is treated briefly. The book is carefully written. There are numerous photographs and a map of Australia's railroad systems. WILBUR GREELEY BURROUGHS.

The Sheep and Wool Industry of Australasia. A practical handbook for sheep farmers and wool-classers. By Henry B. Smith. xvi and 187 pp. Ills. Whitcombe & Tombs, London, 1914. 8s. 6d. 9 x 5½.

A technical trade manual. In clear and plain language, the writer recounts the sheep history of Australasia, and describes the various breeds which thrive best there. Sheep selection, the breeding of fat lambs, shearing, the qualities and tests of wool, wool-moisture, wool-sorting, the manufacture of woolens and worsteds, the various textile fibres, including rabbit-fur, camel's hair, horse-hair, cow-hair, llama-wool and silk; wool-classing, the pressing of wool, the fastening and branding of bales, wool-scouring, wool-buying and selling, the removal of wool from sheep skins, and the preparing of sheep-skins for the market. Then follow chapters on the method of preparing for the market the other skins, obtainable by farmers, and on killing, skinning, and dressing a sheep. A glossary of terms and their meaning, as used in the sheep industry, is appended. Handsome half-tones of the best breeds of Autralasian sheep are interspersed. DAVID H. BUEL.

The Volcanoes of Kilauea and Mauna Loa. By William T. Brigham. 222 pp. Map, ills. *Mem. Bernice Pauahi Bishop Mus.*, Vol. 2, No. 4. Honolulu, H. I., 1909. 12½ x 9½.

The sub-title—"their variously recorded history to the present time"—accurately describes the work. It is a profusely illustrated compendium of narratives of visits by many observers. There is no attempt at analysis of the facts observed, but much material is here for their study. Only works in English are quoted from, which must subtract a good deal from the completeness of the record. The reviewer is not familiar with the literature of the Hawaiian islands, but he is quite confident that not a few well-trained German observers have visited them and recorded observations of value, to say nothing of Frenchmen and others. The author's part (he has made a number of visits to the mountains at long intervals) is gossipy and personal rather than scientific. The pictures and plans give a pretty complete idea of the facts, as well as of the climate and circumstances attendant upon climbing the mountains. There is a very striking colored frontispiece by Mr. Charles Furneaux of the lake of Halemaumau by night. Many of the photographs are admirable.

MARK JEFFERSON.

EUROPE

British Rainfall, 1913. Compiled under the direction of H. R. Mill. By R. C. Mossman and C. Salter. Fifty-third annual volume. 92 and 384 pp. E. Stanford, Ltd., London, 1914. Price 10s.

For over half a century *British Rainfall* has been one of the important meteorological publications of each year. It presents the essential facts concerning the precipitation of the British Isles clearly, concisely, and always with interesting discussions of certain especially noteworthy phenomena. The fifty-

third volume contains, as special contributions, an appreciative biographical memoir of the late Sir John Murray, who represented Scotland on the Board of Trustees of the British Rainfall Organization; an account of the dry summer of 1913, in which the deficiency of rainfall over the United Kingdom as a whole was 60%; and a discussion of the frequency of heavy rains of short periods, 1868-1913.

We note, with pleasure, that Dr. Mill has been so far restored in health by his six months' trip around the world that he was able to contribute the appreciation of his old master, the late Sir John Murray, and other obituary notices, to this volume. We greatly regret that the Rainfall Organization, which is dependent upon voluntary contributions, is not self-supporting, and that the director himself has to make up considerable deficiencies. An application for government aid has become necessary, and this surely deserves early and favorable action. R. DEC. WARD.

The Charm of Ireland. By Burton E. Stevenson. 576 pp. Ills., index. Dodd, Mead & Co., New York, 1914. $2. 8½ x 6.

A book like this, giving one's impressions received during a tour through Ireland, invites inevitable comparison with Kate Douglas Wiggins' "Penelope in Ireland." It is no disparagement of the work to say that, although interesting and entertaining, it does not equal "Penelope" in literary charm. Charm is an elusive quality, easily felt, but hard to define and describe. That the writer and "Betty," his wife, found Ireland charming, and were charmed by it, is evident; but in just what that charm of Ireland consists is not made clear. There are numerous conversations with the natives recorded, which give the book the characteristic Irish flavor. The well-known historical events connected with the various localities visited are rehearsed in some detail. All defense of Cromwell's massacre at Drogheda is abandoned. Some space is given to explain the north of Ireland opposition to Home Rule, and it is asserted that fear of loss to the pocketbook, and not of the loss of Protestant faith, is at the back of the movement. The legendary lore of saint and fairy is related with sympathy, prominent among which is the account of the Blarney stone. The writer found many pretty views for his camera. DAVID H. BUEL.

Genova Preromana, Romana e Medioevale. Di Gaetano Poggi. xxiv and 306 pp. Ills. G. Ricci, Genoa, 1914. L. 10. 9½ x 6½.

This volume fits well with other recent studies of the history of Genoa—Donaver on the republican period and Orlando Grosso on San Giorgio and the golden legend. They form a series exhibiting the civic pride of the Genovese. Poggi takes for his theme the earliest stages of the city as a more or less formally organized site of human abode. He does not discuss the really prehistoric period. His first datum is the Etruscan culture, a period for which no considerable mass of data is available. In the advance of the Roman tribe toward the conquest of the peninsula the author arrives at surer ground with each succeeding century. In the late republican and early imperial period he is able to present a graphic picture of the development of a great commercial community in whose settlement both military necessity and mercantile opportunity utilized the possession of a port. The port is the key of the Genovese community, the place where the shallops of the sea raiders might draw up on shore, and Poggi wisely makes the port the center of his story. The port grew, in time, from a sheltered beach under the lee of a point to a market place for the greater vessels which went on distant cruises. It was improved by art as need became greater; it has proved equal to the shelter of the great oceanic liners of the present. In all this story of the growth of the city the story of the port is central, though not exclusive. The author has made very clear how the town grew up about the harbor with provision for warehouses and for the accommodation of widely roving traders. Few cities of the Middle Ages have been more intelligently studied, few, indeed, more sympathetically described.
WILLIAM CHURCHILL.

Siciliana. Sketches of Naples and Sicily in the 19th Century. By F. Gregorovius. Translated from the German by Mrs. G. W. Hamilton. vii and 346 pp. Index. The Macmillan Co., New York; Bell & Sons, London, 1914. $1.60. 7½ x 5.

Gregorovius was an eminent scholar who combined, with accuracy, great powers of vivid description. This book is a translation chiefly from the third volume of his "Wanderjahre in Italien," published in 1853, and from his "Kleine Schriften" which appeared in 1888. But Gregorovius dealt so largely with ancient and mediæval history, architecture and scenery that his writings retain their freshness and interest even though written long ago; and it is a boon to readers of English to present in their vernacular these large excerpts from his fascinating papers.

L'Italia Moderna (1750–1913). Di Pietro Orsi. 4th edit. Continuata fino alla conquista della Libia. xvi and 535 pp. Maps, ills., index. U. Hoepli, Milan, 1914. L. 7.50. 7½ x 5.

Orsi's work is already familiar and has attained a standard position in the history of the House of Savoy and the establishment of the kingdom of Italy. This fourth and augmented edition carries the story of events through the Libyan war, and in the treatment of these contemporary affairs the author has preserved a most judicial balance in his comment on political and military leaders. Referring the present edition to the first edition (1900) we find the additions comprised in three new chapters, together with expansions of earlier estimates of the leading figures in the life of the opening century.

WILLIAM CHURCHILL.

Lande og Folk. Skildringer og Livsbilleder fra de Skandinaviske Lande. (Lys over Land.) Edited by E. Akerhjelm, G. Andersson, T. Thoroddsen, K. Rasmussen, and many others. 826 pp. Maps, ills. Gyldendalske Boghandel, Copenhagen, 1910. 10 x 7.

Under the direction of an editorial board headed by Dr. Bank the most eminent Scandinavian scholars are producing a popular encyclopedia of the northern lands with the attractive title "Lys over Land." The first volume of the geographical section of the work is "Lande og Folk," consisting of a score of essays upon the lands and the people by distinguished authorities. In addition to Denmark and the Scandinavian peninsula these essays cover lands so remote as the Faroes, Iceland and Greenland, all with a very satisfacory amount of information excellently presented. WILLIAM CHURCHILL.

Foreigners in Turkey: Their Juridical Status. By Philip M. Brown. vii and 157 pp. Index. Princeton University Press, Princeton, 1914. $1.25. 8½ x 6.

The matter with which this monograph has to do passed into history shortly after the book was published, for early in September the Sublime Porte published the rescission of the capitulations. The monograph begins with the origin of the doctrine of extra-territoriality as the right of the Christian when within the territory of the Mohammedan. By successive concessions obtained through war or through the manœuvring of diplomatic activity the principle has been expanded into a body of municipal law of considerable volume. The maintenance of this law covering the existence of a state within a state has called at times for armed demonstrations of force, and at all times has been jealously safeguarded by the Western nations. On the other hand, it has been objectionable to the Turkish authorities, both on civil and religious grounds, and efforts have, from time to time, been made to abolish the system.

WILLIAM CHURCHILL.

POLAR

The Heart of the Antarctic. Being the story of the British Antarctic Expedition 1907-1909. By Sir Ernest Shackleton. New and revised edit. xv and 368 pp. Map, ills., index. J. B. Lippincott Co., Philadelphia, 1914. $1.50. 7½ x 5.

A handsome volume that may easily be held in the hand while reading. It

contains most of the narrative that appeared in the sumptuous two-volume edition of Shackleton's work, but omits much of the detailed scientific matter; and it seems too bad that Dr. Mill's fine résumé of Antarctic exploration had to be omitted also. The book, however, is one of the best reproductions of the larger part of an expansive work on Polar exploration at a cheap price that has been made. All the essentials excepting scientific data that the general public prefers to read in simplified form are included.

National Antarctic Expedition, 1901–1904—Magnetic Observations. 274 pp. Map, diagrams. Royal Society, London, 1909. 12½ x 9½.

This volume forms the third one devoted to the observations and results in geophysics obtained on the Antarctic expedition of 1901-1904 under the leadership of the late Captain Scott. The first volume dealt with "Meteorology" and the second with "Physical Observations," in which the tidal, gravity, seismic, auroral and ocean magnetic observations were discussed. The present volume contains the magnetic observations and results obtained at the magnetic observatory from May, 1902, to January, 1904, in McMurdo Sound, latitude 77°50′.8 S. and longitude 166°44′.8 E.—the *Discovery's* winter quarters. The instruments consisted chiefly of a Kew magnetometer, a dip-circle and an Eschenhagen-Toepfer magnetograph.

The strenuous duties of observer-in-charge were performed by Mr. L. C. Bernacchi, who also assisted Dr. C. Chree in the "Discussion of the Observations," which forms the principal part of the volume under review. Besides the usual tables and results which are found in volumes on magnetic-observatory work, Chree devotes considerable space to a discussion of magnetic disturbances of various types. Appendix B contains, furthermore, an examination of Antarctic magnetic disturbances from October, 1902, to March, 1903, which are simultaneous with Arctic disturbances, previously discussed by Prof. Kr. Birkeland of Christiania. While Chree finds correspondences, he also shows that there are certain disagreements from the effects predicted by Birkeland, and so he is led to making a critical analysis, for an account of which the interested reader must be referred to the original volume. L. A. BAUER.

Vorlaüfiger Bericht über die meteorologischen Beobachtungen der Deutschen Antarktischen Expedition, 1911–1912. Von E. Barkow. *Veröffentl. d. k. Preuss. meteorolog. Instituts, No. 265.* (Abh., Vol. 4, 1913, No. 11), pp. 1-11.

This is the preliminary report of the Filchner expedition to the Antarctic on the *Deutschland.* The scientific reports have proved to be of very considerable value to glacialists and meteorologists. The expedition extended our knowledge of the Weddell Sea southwestward beyond Coats Land to the newly discovered Vahsel Bay and Luitpold Land. Three months were spent on this bay, and the meteorological observations show a close relationship in severity of the temperatures with those recorded from the similarly high latitude of Ross Sea. The sudden changes of temperature reported by the Swedish expedition in West Antarctica were not experienced. Observations over the inland ice and simultaneously upon the vessel, and covering a period of several days, showed the temperature above the inland ice to be colder by 2° C. A noteworthy uniformity both of temperature and of wind velocity was the rule. With an average wind velocity of as much as three-fourths of the Beaufort scale there were few storms (8 or more of Beaufort scale), and even fewer calms. There was much less constancy in the winds than observations at other Antarctic stations have shown. The westerly winds were most common, which, with the manner of shifting, indicated the presence of a low area eastward of the drift of the vessel. At the Vahsel Bay station generally clear weather prevailed, owing to the proximity of the inland ice, but farther off shore a cloudy sky was the rule. As is generally true in Antarctica, greater cloudiness characterized the summer, for which season the unusually high value of 9 was obtained. The precipitation was throughout very slight, and mainly in the form of hoar-frost. The precipitation for the entire year, based upon somewhat inexact data, amounted to only 97.5 mm.

Of more special interest are the observations made of the troposphere by means of kites, captive balloons and pilot balloons, in all 255 ascents distributed over 209 days. Almost throughout, these observations reveal a strong lower inversion, which was more marked in the winter season, and which was generally in excess of 10° C. (maximum 19.5° C.). Above the inversion there generally followed an isothermal layer or one of only slight temperature fall, so that in general the abnormal condition extended upward to a height of 2000 meters (about 1¼ miles). In the spring particularly an alternation of layers (Blätterstruktur) was characteristic of this lower zone within the troposphere. The relationship of such inversions in the troposphere, which have now been proved also for the northeastern and the western margins of the continental glacier of Greenland, to the fixed glacial anticyclone above the inland ice, is obvious, though not referred to by Barkow.

With pilot balloons it was found possible, by reason of the great clarity of the atmosphere, to carry the observations beyond the ceiling of the troposphere, which was here found to have an altitude of somewhat less than nine kilometers (about 5¼ miles), which level was usually made apparent by the sudden change of the wind direction. Meinardus believes that easterly winds are the rule up to an altitude of 2,000 meters, above which is to be found the westerly, polar whirl which is so important a feature in Ferrel's theory of wind circulation. Barkow's results indicate that this whirl, if it exists, is likely to be above the troposphere ceiling. Up to this level the winds, with strong northerly components, were generally easterly or southeasterly, but suddenly change at the top of the troposphere to a southwesterly direction. It must be borne in mind that these observations were made at the margin of the inland ice and on the borders of an area of low atmospheric pressure. WILLIAM H. HOBBS.

PHYTOGEOGRAPHY AND ZOOGEOGRAPHY

Lehrbuch der Paläozoologie. Von Ernst Freiherr Stromer von Reichenbach. 1. Teil: Wirbellose Tiere. 342 pp. 2. Teil: Wirbeltiere. 325 pp. Ills., indexes. (Naturwissenschaft und Technik in Lehre und Forschung.) G. B. Teubner, Leipzig, 1909 and 1912. Mk. 10 each. 9½ x 6½.

This work gives a very good account of fossil animals. The author discusses the characteristics of the various animal groups, their relationships, and gives many typical examples of each group. The geological distribution and the development of the various animal groups are also included.

Following each group discussion is an analytical table of the orders of the group. This table not alone gives the characteristics of the order, but the distribution of the members of the order in geological time. Extensive references are given by groups. The illustrations are excellent and well adapted to bring out clear notions of the animal types described. The internal structure of a few animals is given.

The geographical distribution of the extinct mammals receives considerable attention. A table of the geographical distribution of mammals in the Mesozoic and Tertiary ages is given on page 224 of the second volume. Considerable attention has also been given to ecology and evolutionary theories. The work is well done and authoritative, and should be on the shelves of every zoological library. R. W. SHARPE.

METHODOLOGY AND TEACHING

South America. A Supplementary Geography. By J. F. and A. H. Chamberlain. (The Continents and Their People.) 189 pp. Ills., index. The Macmillan Co., New York, 1913. 55 cents. 7½ x 5.

The object of this book is "to present the physical and human phases of geography in such a way as to cause them to appeal to the interests of children and to lead pupils to see the more obvious relationships between the two." This object is well attained.

The seventeen chapters treat of the continent and its parts as follows: One chapter to the continent as a whole, eleven chapters to the respective

countries, one to the Amazon River ("The World's Greatest River"), one to the "Coffee Industry in Brazil," one to "The Metropolis of the Southern Hemisphere" (Buenos Aires), one to the "Cocoa Industry in Ecuador," and one to the "Turtle Islands" (Galapagos Islands). The reading matter is alive. It holds the attention constantly and therefore is well adapted to the minds of elementary students as a source of supplementary information.

With the significance to us of South America growing daily, such a clear, attractive description and discussion as is contained in this volume will prove most helpful to our junior citizens.

The illustrations are well selected. EUGENE VAN CLEEF.

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WORLD AND PARTS OF IT

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Topographic Sheets

(*Including Combined and Special Topographic Maps*)

Alaska. Port Valdez District, Prince William Sound Region. Surveyed in 1911 and 1912. 1: 62,500. 61°16′ - 61°0′ N.; 146°56′ - 146°7′ W. Contour interval 50 ft. Alaska sheet No. 602 B. Edition of Feb. 1915.

Arizona. Benson Quadrangle. Surveyed in 1912-1913. 1: 125,000. 32°0′ - 31°30′ N.; 110°30′ - 110°0′ W. Interval 100 ft. Edit. of Jan. 1915.

[The Tombstone district in the east-central part of this sheet has already been published in detail on the special map, 1: 24,000, and the mining map, 1: 6,000.]

California. Priest Valley Quad. Surveyed in 1908-1909 and 1912-1913. 1: 125,000. 36°30′ - 36°0′ N.; 121°0′ - 120°30′ W. Interval 100 ft. Edit. of March, 1915.

[The valley of the Salinas River in the southwestern corner of the sheet has already been published on the scale of 1: 31,680.]

Colorado. Topographic Map of Mesa Verde National Park, Montezuma County.* Surveyed in 1910-11. 1: 31,250. 37°2′10″ - 37°9′20″ N.; 108°37′30″ - 108°15′0″ N. Interval 25 ft. With inset of Colorado entitled: Railroad Lines leading to Mesa Verde National Park. [1: 5,000,000.] 1915.

[Cliff dwellings and pueblos are indicated.]

Idaho–Wyoming. Crow Creek Quad. Surveyed in 1911 and 1912. 1: 62,500. 42°45′ - 42°30′ N.; 111°15′ - 111°0′ W. Interval 50 ft. Edit. of Feb. 1915.

Illinois–Missouri. Renault Quad.* Surveyed in 1911 and 1913. 1: 62,500. 38°15′ - 38°0′ N.; 90°15′ - 90°0′ W. Interval 20 ft. Edit. of Jan. 1915.

Michigan. Houghton Quad. Surveyed in 1908, 1909, 1911, and 1912. 1: 62,500. 47°15′ - 47°0′ N.; 88°45′ - 88°30′ W. Interval 20 ft. Edit. of Feb. 1915.

[The northeast corner of the sheet has already been published in 1911 as the Calumet special map, 1: 62,500.]

Minnesota. Underwood Quad. Surveyed in 1911-1912. 1: 62,500. 46°30′ - 46°15′ N.; 96°0′ - 95°45′ W. Interval 10 ft. Edit. of Mar. 1915.

Missouri–Illinois. Crystal City Quad. Surveyed in 1911 and 1913. 1: 62,500. 38°15′ - 38°0′ N.; 90°30′ - 90°15′ W. Interval 20 ft. Edit. of Mar., 1915.

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* On these sheets woods are shown in green.

Montana. (a) Cuskers Quad. Surveyed in 1909-1910. 1: 62,500. 48°30′ - 48°15′ N.; 105°30′ - 105°15′ W. Interval 20 ft. Edit of Jan. 1915.

(b) Todd Lakes Quad. Surveyed in 1910. 1: 62,500. 48°30′ - 48°15′ N.; 106°0′ - 105°45′ W. Interval 20 ft. Edit. of Feb. 1915.

(c) Tule Valley Quad. Surveyed in 1909-1910. 1: 62,500. 48°30′ - 48°15′ N.; 105°45′ - 105°30′ W. Interval 20 ft. Edit. of Jan. 1915.

New York. Number Four Quad.* Surveyed in 1910-1912. 1: 62,500. 44°0′ - 43°45′ S.; 75°15′ - 75°0′ W. Interval 20 ft. Edit. of Jan. 1915.

Oregon-Idaho. Pine Quad.* Surveyed in 1911-1912. 1: 125,000. 45°0′ - 44°30′ N.; 117°30′ - 117°0′ W. Interval 100 ft. Edit. of Jan. 1915.

Utah. Sunnyside Quad. Surveyed in 1910-1911 and 1913. 1: 62,500. 39°45′ - 39°30′ N.; 110°30′ - 110°15′ W. Interval 50 ft. Edit. of Jan. 1915.

[Contains the scarp face of the western end of the Roan or Book Cliffs, overlooking the Castle Valley. The area of this sheet is included on the Price River reconnaissance sheet, 1: 250,000, published in 1886.]

West Virginia. Meadow Creek Quad.* Surveyed in 1912. 1: 62,500. 38°0′ - 37°45′ W.; 81°0′ - 80°45′ W. Interval 50 ft. Edit. of Feb. 1915.

[Co-extensive with the northwestern quarter of the old Hinton sheet, 1: 125,000, last published in 1892.]

SOUTH AMERICA.

Argentina. (a) Map Showing the Relation of Argentina to the United States. [1: 47,000,000.] 60° - 20° N.; 130° - 60° W. 1 color.

(b) [Two maps of Argentina showing] (1) Curves of Temperature: Comparison of maxima, mean, and minima temperatures of Argentina with those of the United States. 3 colors. (2) Mean Annual Rainfall in millimeters. 1 color. Both: [1: 23,000,000]. 19½° - 55° S.; 78° - 46° W.

(c) Plan of the San Antonio Railroad and Projected Branches. [1: 3,175,000]. 38⅔° - 44° S.; 75° - 61° W.

(d) General Map of Northern Patagonia. 1: 1,500,000. 38½° - 44° S.; 74⅔° - 62½° W. 2 colors.

(e) [Eight topographic sheets of the "Forty-First Parallel Survey," 1: 200,000, in 3 colors;] (1) San Antonio Oeste. 40°40′ - 40°55′ S.; 65°30′ - 64°44′ W. (2) Valcheta. 40°15′ - 40°54′ S.; 66°30′ - 65°30′ W. (3) Corral Chico. 40°21′ - 40°52′ S.; 67°30′ - 66°30′ W. (4) Sierra Colorada. 40°29′ - 41°0′ S.; 68°26′ - 67°30′ W. (5) Maquinchao. 41°0′ - 41°22′ S.; 69°0′ - 68°8′ W. (6) Marilaufquen. 41°0′ - 41°31′ S.; 70°0′ - 69°0′ W. (7) Pilcaniyeu. 41°3′ - 41°31′ S.; 71°0′ - 70°0′ W. (8) Nahuel Haupí Sudeste. 40°59′ - 41°30′ S.; 71°33′ - 71°0′ W. Comisión de Estudios Hidrológicos, Bailey Willis, Geólogo-Jefe; Ministerio de Obras Públicas, Ezequiel Ramos-Mexía, Ministro.

(f) Mapa Topografico de la Cordillera de los Andes. 1: 200,000. 3 colors. [Four sheets:] Hoja I: 39°40′ - 40°40′ S.; 72°10′ - 71°0′ W. Hoja II: 40°40′ - 41°40′ S.; 72°10′ - 71°0′ W. Hoja III: 41°40′ - 42°40′ S.; 72°10′ - 71°0′ W. Hoja IV: 42°40′ - 43°40′ S.; 72°10′ - 71°0′ W. Comisión de Estudios Hidrológicos, Bailey Willis, Geólogo-Jefe.

(g) [Twelve land classification maps, entitled:] Clasificación de Terrenos. 1: 200,000. 8 colors. (1) Lago Huechulaufquen. 39°40′ - 40°0′ S.; 71°48′ - 71°0′ W. (2) Lago Lacar. 40°0′ - 40°20′ S.; 71°56′ - 71°0′ W. (3) Lago Traful. 40°20′ - 40°40′ S.; 72°10′ - 71°0′ W. (4) Lago Nahuel Huapí Norte. 40°40′ - 41°0′ S.; 72°10′ - 71°0′ W. (5) Lago Nahuel Huapí Sud. 41°0′ - 41°20′ S.; 72°0′ - 71°0′ W. (6) Rio Manso. 41°20′ - 41°40′ S.; 72°7′ - 71°0′ W. (7) El Bolsón. 41°40′ - 42°0′ S.; 72°10′ - 71°0′ W. (8) Lago Puelo. 42°0′ - 42°20′ S.; 72°5′ - 71°0′ W. (9) Lago Cholila. 42°20′ - 42°40′ S.; 72°10′ - 71°0′ W. (10) Lago Fetalaufquen. 42°40′ - 43°0′ S.; 72°10′ - 71°0′ W. (11) Rió Fetaleufu. 43°0′ - 43°20′ S.; 72°10′ - 71°0′ W. (12) Rió Corcovado. 43°20′ - 43°40′ S.; 72°10′ - 71°0′ W.

* On these sheets woods are shown in green.

(h) Proposed Development of Cities and Railroads in the Vicinity of Lago Nahuel Huapí. [1: 200,000]. 40°57′ - 41°11′ S.; [71°30′ - 71°2′ W.] 3 colors.

(i) [Two maps of the Andean region showing] (1) Mean Annual Rainfall in Millimeters. (2) Frequency of the Winds. Both: [1: 3,500,000] 38⅔° - 44° S.; 74⅔° - 79° W. 2 colors.

Accompany "Northern Patagonia" (report of the Comisión de Estudios Hidrológicos, 1911-1914, Ministry of Public Works, Argentine Republic) by Bailey Willis, New York, 1914, as follows: Map (a) facing p. 3; maps under (b) facing pp. 4 and 8, respectively; map (c) facing p. 50; maps under (d), (e) and (f) in separate pocket; maps under (g) facing respectively pp. 288, 294, 300, 306, 312, 318, 324, 330, 334, 340, 346, and 350; map (h) facing p. 409; maps under (i) facing p. 435. All maps are engraved by the Topographic Engraving Co., Washington.

[These maps represent the cartographic results of the work of the Comisión de Estudios Hidrológicos across northern Patagonia in 1911-14, felicitously designated for short, after a classical analogy, the "Forty-First Parallel Survey." Both in content and in form the best traditions of our former and our present surveys have been maintained: the topographic maps are executed in the style of the U. S. Geological Survey sheets, and it is not a far cry from the present land classification maps to those of the Wheeler survey. The work of the Comisión, carried out mainly by Americans under the able direction of Bailey Willis, is a notable contribution to our share of the world's work in opening up undeveloped lands.

Map (a) shows Argentina superposed in latitude on the United States with the meridians of New Orleans and Buenos Aires made coincident, thus affording a valuable comparison. On map (b) the mean annual isotherms of 5°, 10°, 15°, 20° C., the absolute minima of —20°, —10°, 0° C. and the absolute maxima of 30°, 40°, 44° C. are shown. The interval of the isohyets on map (b) is 200 mm. Maps (c) and (d) are general maps of northern Patagonia, the former showing the railroad systems, while the latter summarizes the whole topographical work of the Comisión and is thus the standard general map of the region; on it relief is shown in brown contours (interval, 100 m.), drainage in blue, the rest in black. The eight topographic sheets listed under (e) similarly represent relief in brown contours (interval 20 m.) and drainage in blue. The four sheets of the Andean region (f) are based on the maps of the Chile-Argentina Boundary Commission, with corrections. The contoured relief is supplemented by shading. The twelve land classification sheets (g) cover the same longitudinal area that the Andean map does, but subdivide it in latitude into 20′ strips. Six land classifications are distinguished in colors: (1) alpine zone; (2) virgin forests; (3) brushy mountain slopes; (4) recent burns; (5) grassy *serranias;* (6) agricultural lands. Map (h) shows in a section of (e8) the proposed site of the industrial city of Nahuel Haupí. The maps under (i) present the meteorology of the Argentine Andean region between 39° and 44° S.]

ASIA.

Asia, etc. Die Zusammenhänge des Zerrungsphänomens beim Grossen und Indischen Ozean. Entworfen von Wilhelm Volz. [Two maps:] 1. Übersicht der Verbreitung und Verteilung der grossen Vertikalbewegungen. Equatorial scale 1:120,000. Hemisphere included between 60° E. and 120° W. 1 color. 2. Das Zerrungsphänomen des Grossen und Indischen Ozeans. Mercator's projection, equatorial scale 1:100,000,000. 70° N. - 50° S.; 30° E. - 150° W. 2 colors. Accompanies, as Taf. 23, "Der ostasiatische Landstufenbau als Ausdruck oberflächlicher Zerrung" by W. Volz, *Petermanns Mitt.*, Vol. 60, II, 1914, Oct., pp. 174-178.

[Map 1 shows the depressional areas and troughs of the Pacific and Indian Oceans and the relation of the Malayan fault zone to them. Map 2 shows the following: escarpments, both terrestrial and sub-oceanic; ocean troughs and ridges; Quaternary and Tertiary volcanic zones; and macroseismic lines after after Rudolph.]

Dutch East Indies. Karte von Mittel-Seran unter Benutzung der Aufnahmen von K. Deninger und E. Stresemann nach eigenen Aufnahmen

gezeichnet von O. D. Tauern. 1:125,000. 2°45′ - 3°26′ S.; 129° 1.2′ - 129°42.0′ E. 4 colors. Accompanies "Reisebeobachtungen von der Insel Seran" by O. D. Tauern, *Petermanns Mitt.*, Vol. 60, II, 1914, Aug., pp. 75-78.

[Valuable large-scale route survey across the central portion of the island. Relief in approximate contours in brown, drainage in blue, author's route in red. The first part of the text explains the compilation of the map.]

EUROPE.

Belgium. Sprachenverteilung im Generalgouvernement Belgien. 1: 7,300,000. 51°40′ - 49°30′ N.; 2°20′ - 7°20′ E. 4 colors. With inset: Flämische Einwanderung in das Industriegebiet v. Mons u. Charleroi. 1:500,000. 50°32′ - 50°22′ N.; 3°45′ - 4°35′ E. 2 colors. Taf. 22, *Petermanns Mitt.*, Vol. 60, II, 1914, Oct.

[Shows linguistic areas according to the census of Dec. 31, 1910, differentiating between German (small areas near the border), Flemish and Walloon. The number of Germans in the towns of the whole country and of Flemish in the Walloon part of the country are shown; also, the places of publication of Flemish and German newspapers. The distribution of Walloons in the Flemish territory is not shown.]

WORLD AND PARTS OF IT

Greece–Asia Minor. Schematische Übersichts-Skizze der Faltengebirge von Griechenland und Westkleinasien. Von A. Philippson. 1: 3,700,000. 41⅓° - 35° N.; 19⅓° - 31° E. 3 colors. Accompanies, as Taf. 12, "Zusammenhang der griechischen und kleinasiatischen Faltengebirge" by A. Philippson, *Petermanns Mitt.*, Vol. 60, II, 1914, Aug., pp. 71-75.

[Differentiates between the crystalline masses and the folded mountains, indicating the subdivisions and trend of the latter.]

Other Maps Received

NORTH AMERICA

United States

Illinois. Olcott's land value maps of Chicago. Revised from maps published monthly in the land values record. 130 pp. incl. 112 maps. G. C. Olcott, Chicago, 1910.

Massachusetts. Atlas of the boundaries of the cities of Chicopee and Springfield, and towns of Brimfield, East Longmeadow, Hampden, Holland, Longmeadow, Ludlow, Monson, Palmer, Wales, Wilbraham, Hampden county; Belchertown, Granby, South Hadley, Ware, Hampshire county; Brookfield, North Brookfield, Southbridge, Sturbridge, Warren, West Brookfield, Worcester county. [73] pp. incl. 12 maps. Harbor and Land Commission, [Boston], 1912.

Atlas of the boundaries of the city of Fitchburg and towns of Ashburnham, Athol, Gardner, Leominster, Lunenburg, Phillipston, Royalston, Templeton, Westminster, Winchendon, Worcester county; Bernardston, Erving, Gill, Montague, Northfield, Orange, Warwick, Wendell, Franklin county; Ashby, Townsend, Middlesex county. 40 pp. incl. 10 maps. Harbor and Land Commission, [Boston], 1909.

Atlas of the boundaries of the city of Worcester and towns of Auburn, Blackstone, Charlton, Douglas, Dudley, Grafton, Hopedale, Leicester, Mendon, Milford, Millbury, Northbridge, Webster, Westborough, Worcester county; Hopkinton, Middlesex county. 41 pp. incl. 13 maps. Harbor and Land Commission, [Boston], 1908.

New Hampshire. Appalachian Mountain Club map of the northern peaks of the great range, White Mountains, N. H., by Louis F. Cutter. 1: 40,000. Accompanying "Appalachia," Oct. 1914.

Washington. Kroll's standard map of Seattle. [1: 57,000.] Kroll Map Co., Seattle, 1914.

AFRICA

Canary Islands. Plano de Santa Cruz de Tenerife. Facilitado y revisado por el Ayuntamiento. 1: 6,500. Alberto Martin, Editor, Barcelona, [1915].

Egypt. G. Freytags Kriegskarte von Ägypten, Palästina und Arabien. 1: 5,000,000. G. Freytag & Berndt, Wien [1914].

Bartholomew's tourist map of Egypt and the Lower Nile, prepared from the latest surveys. 1: 1,000,000. John Bartholomew & Co. [Edinburgh), [1915?].

Italian Somaliland. Carta della Somalia Italiana. 1: 50,000. Sheets: Muriole (1911), Giumbo (1910), Torda (1911), Camsuma (1913), Vadda (1911), Margherita (1911), Arenaga (1913), Gelib sul Giuba (1913), Aughele (1913). Istituto Geografico Militare [Florence].

ASIA

Turkey in Asia. Kalimno to Rhodes, including the Gulfs of Kos, Doris and Symi. From British surveys between 1837 and 1864. Scale approximately 1: 275,000. Chart No. 4,193. Hydrographic Office, Washington, 1914.

Rhodes Island to Kara Burnu. Turkey in Asia. From British surveys to 1884. Scale approximately 1: 444,000. Chart No. 3969. Hydrographic Office, Washington, 1914.

Kara Burnu to Karadash Burnu. From a British survey in 1812 with additions to 1884. Scale approximately 1: 444,000 . Chart No. 3970. Hydrographic Office, Washington, D. C., 1914.

Markhab to Ras En-Nakura. From a British survey in 1860. Scale approximately 1: 275,000. Chart No. 3973. Hydrographic Office, Washington, 1914.

AUSTRALASIA AND OCEANIA

Australia. Talgarno. 40 chains to 1 in. Geological Survey of Victoria. [Melbourne], 1915.

New Guinea. Übersichtskarte der Expeditionen nach Zentral-Neu-Guinea 1907 und 1909/10 unter der Leitung von Dr. H. A. Lorentz. 1: 200,000. Accompanying "Uitkomsten der Nederlandsche Nieuw-Guinea-Expeditie in 1907 en 1909 onder Leiding van Mr. H. A. Lorentz." E. J. Brill, Leiden, 1913.

EUROPE

Austria-Hungary. Geologische Spezialkarte der im Reichsrate vertretenen Königreiche und Länder der Österreichish-Ungarischen Monarchie, neu aufgenommen und herausgegeben durch die k. k. Geologische Reichsanstalt. 1: 75,000. Zone 7, Col. xiv, Polička und Neustadtl; Zone 7, Col. xv, Brüsau und Gewitsch; Zone 16, Kol. 111, Lech Tal; Zone 27, Kol. X, Unie und Sansego; Zone 29, Kol. XI, Zapuntello; Zone 31, Kol. XV, Sinj und Spalato; Zone 32, Col. XIV, I. Solta; Zone 33, Col. XIII, I. St. Andrea; Zone 34, Col. XIV, I. Busi. Ausgegeben 1914. Verlag der k. k. Geolog. Reichsanstalt, Wien.

Balkan Peninsula. Die Grenzgebiete Österreich-Ungarns und Serbiens. 1: 1,250,000. G. Freytag & Berndt, Wien [1914].

Europe. Brooklyn Daily Eagle war maps. [8 maps on various scales]. The Brooklyn Daily Eagle, Brooklyn, 1914.

Norway. Topografisk kart over kongeriget Norge. Sheet 3 D, Egersund. 1: 100,000. Accompanying "Egersund, fjeldbygningen inden rektangelkartet Egersunds omraade," av. Prof. Dr. Carl Fred. Kolderup, *Norges Geologiske Undersökelse; Nr. 71.* Kristiania, 1914.

Spain. Salamanca. 1:500,000. Alberto Martin, Editor, Barcelona [1915].

Gibraltar to Adra, Spain—South East Coast. From Spanish Surveys to 1890. Scale approximately 1:300,000. Chart No. 3929. Hydrographic Office, Washington, 1914.

Sweden. Sveriges Jännvägar vid slutet av ar 1913. 1:2,000,000. Accompanying "Statens Järnvägar ar 1913 av Kungl. Järnvägsstyrelsen." 1914.

EDUCATIONAL

Geographischer Bürgerschul-Atlas. Bearbeitet von Prof. Joh. Georg Rothaug. 52 Karten. G. Freytag & Berndt, Wien, 1914. 4 Kronen.

Atlante Storico per le Scuole Secondarie del Prof. Costanzo Rinaudo. Parte prima: Il Mondo Antico, 19 carte e repertorio di tutti i nomi; Parte seconda: Il Medio Evo, 20 carte e repertorio di tutti i nomi; Parte terza; I Tempi Moderni, 28 carte e repertorio di tutti i nomi. Ditta G. B. Paravia e Comp., Torino [1914]. Parts 1 and 2, L. 2.60; part 3, L. 3.

W. & A. K. Johnston's series of history maps. No. 8, Ireland (Éire) in the XIIth century prior to the Anglo-Norman occupation, 1:500,000; 9, Ireland in the middle of the XVIth century, 1:500,000; 11, Greece and the Ægean, 1:1,100,000; 15, The World, illustrating the age of the discoveries, 1:44,000,000; 16 [a], Europe at the time of Louis XIV, 1702, 1:9,100,000; [b], Europe under Napoleon, 1810, 1:9,100,000. W. & A. K. Johnston, Ltd., Edinburgh [1915].

Philips' wall atlas of modern history. Edited by Prof. Ramsay Muir, M.A., & George Philip, F.R.G.S. [Set of 8 maps mounted as wall atlas.] 1, Europe about 800 A.D.; 2, Roman Britain, 1:1,000,000; Anglo-Saxon England in the Heptarchic period, 1:1,000,000; 3, Europe in the age of the crusades, 1:4,500,000; 4, Mediæval England & Wales, 1:1,000,000; England in France, 1:2,000,000; 5, Europe at the time of the Reformation—1555, 1:3,500,000; 6, North-western Europe, 1:1,500,000; 7, Europe under Napoleon—1810, 1:3,500,000; 8, England in 1700, 1:1,000,000; England in 1911, 1:1,000,000. George Philip & Son, Ltd., London, 1914.

ATLASES

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